Residuals Management Facilities Plan

DRAFT REPORT ON SITE SCREENING ANALYSIS

Volume I - Site Screening Methodology

August 1987

for a cleaner Boston Harbor

WATER RESOURCES AUTHORITY
MASSACHUSETTS

Black & Veatch
Boston, Massachusetts

DRAFT REPORT ON SITE SCREENING ANALYSIS

Volume I - Site Screening Methodology

August 1987

Prepared for the

Massachusetts Water Resources Authority

Prepared by:

ERT - A Resource Engineering Company
Concord, Massachusetts
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Under Subcontract to:

Black & Veatch, Inc.
Boston, Massachusetts

NOTICE TO REVIEWERS

Transmitted herewith for your review is a draft report Site Screening Analysis, Volume I: Methodology. This report is one of several called for under the Special Procedure issued for the Residuals Management Facilities Plan (RMFP) by the Secretary of the Executive Office of Environmental Affairs in February 1986. This report describes the process that has been used to identify and evaluate a large number of sites as potential locations for facilities that are needed to process, transport, and dispose of the residuals generated by treatment of municipal wastewater from the MWRA sewer service area. It describes the site identification and screening methodology only, and does not include specific sites. The results of the site screening are described in the report Site Screening Analysis, Volume II: Results. The process that has been used to combine sites with specific technologies and transportation systems to form "candidate options", or complete residuals management alternatives for detailed engineering and environmental analyses in the months ahead is described in the report Candidate Options Identification.

This is one of several reports that will serve as the basis for development of the RMFP, a draft of which is scheduled for completion in mid 1988. It will be formally submitted to MEPA in August 1987 together with the companion reports Site Screening Analysis, and Volume II: Results Candidate Options Identification.

To date this document has received MWRA staff review and the results have been provided to the Board of Directors.

Daniel K. O'Brien, P.E.
Acting Director, Engineering Division
August 20, 1987

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EXECUTIVE SUMMARY

A. INTRODUCTION

A significant part of the Residuals Management Facilities Plan (RMFP) being developed by the Massachusetts Water Resources Authority (MWRA) is the identification and evaluation of potential sites for new facilities that will process the residuals that are a byproduct of treating municipal wastewater. The RMFP is a major component of the Boston Harbor clean-up program.

The current effort is the second phase of a staged planning process, and is intended to build upon the results of Phase I. A report on the Phase I work, which documented existing conditions within the MWRA service area, projected future conditions, reviewed potential sites, and recommended a number of technology "process trains" for future evaluation, was filed with the Executive Office of Environmental Affairs (EOEA) in December, 1985.

In February 1986, the Secretary of Environmental Affairs designated the project as "Major and Complicated" and issued a "Special Procedure" for completion of the RMFP. The Special Procedure required that the initial steps of Phase II of the RMFP be conducted in four separate parallel studies: (1) Residuals Characterization, (2) Assessment of Technologies, (3) Assessment of Transportation Alternatives, and (4) Site Screening Analysis. The results of these studies are merged to form candidate options for long term residuals management. The candidate options, which include sites, technology options, and transportation systems, are subsequently to undergo detailed engineering analysis and environmental review, leading to selection of one or more preferred alternatives. Table ES-1 presents the chronology of the RMFP development.

This report documents the methodology used to perform the site screening analysis. The report discusses the procedure used to assemble the universe of potential sites. The methodology applied in screening the sites to an ordered list

TABLE ES-1

CHRONOLOGY OF RESIDUALS MANAGEMENT FACILITIES PLAN DEVELOPMENT

Description of Activity	Report Prepared/Planned	Schedule
Phase I		
Assessed existing condition in the MWRA sewer service area and projected future residuals management needs.	RMFP Interim Report No. 1	December 1985
Initial screening of technology and siting options for satisfying future needs.	RMFP Interim Report No. 2	March 1986
MWRA files Environmental notification form and requests project be designated "Major and Complicated".	MEPA Special Procedure	February 1986
Phase II		
Reassessment of anticipated quality and quantity of future residuals	Characterization of Residuals	February 1987
Review of 12 major technologies and determination of those most viable.	Technology Assessment	February 1987
Analysis of transportation requirements and options available.	Assessment of Transportation Alternatives	February 1987

TABLE ES-1 (Continued)

Description of Activity	Report Prepared/Planned	Schedule
Developed site identification, evaluation, and screening methodology Identification of additional sites. Coastal, inland, and island sites treated and screened equally for all potential technologies.	Site Screening Analysis, Volume I: Methodology	August, 1987
Combine the results of the Residuals Characterization, Technology and Transportation Assessments, and Site Screening Analysis to form candidate options, complete residuals management alternatives (including specific sites), for more detailed engineering and environmental analysis.	Candidate Option Identification	August 1987
Development of evaluation criteria. In-depth engineering and environmental analysis of approximately 30 candidate options for future residuals management. Selection by MWRA Board of Directors of "preferred" option and possibly one or two alternates.	Draft RMFP and EID/EIR (Candidate Options Evaluation)	Mid 1988
Review of public and agency comments on Draft RMFP and EID/EIR. Confirmation of preferred option or selection of another.	Final RMFP and EID/EIR (Options Analysis)	Fall 1988

based on environmental and technical suitability as potential locations for hosting one or more of the residuals management program functions is then discussed. This initial site ordering, referred to as Tier 1 in the RMFP siting process, was conducted without consideration of any specific residuals management technology. Also presented in this report is a discussion of the methodology used to refine the Tier 1 site ordering to a set of technology-specific ordered lists. This portion of the siting process, referred to as Tier 2, incorporates the site requirements of the specific residuals management technologies that formulate complete residuals management alternatives (technologies, sites, and transportation systems). These alternatives will be further analyzed in the Candidate Options Evaluation (Tier 3).

B. TIER 1 SITE SCREENING ANALYSIS

The objectives of the Tier 1 Site Screening Analysis are to: (1) identify the universe of potential sites; and, (2) screen the sites to an ordered listing based on relative suitability for residuals management program use, independent of any specific technology.

1. Identification of the Site Universe

The first step in the Site Screening Analysis was to identify a universe of candidate sites for evaluation. As part of the Special Procedure, the Secretary of Environmental Affairs required that: (1) the screening of the 200+ sites considered in Phase I be reexamined; (2) an effort be undertaken to identify new sites that may have been overlooked in Phase I; (3) the site screening analysis proceed essentially independently of the technology assessment; and, (4) coastal, inland, and island sites be treated and screened equally for all potential technology blocks.

a. Site Identification Criteria. Site identification criteria included: (1) geographic location, (2) minimum acreage, and (3) development status. With respect to geographic location, new sites identified during this phase of the Site Screening Analysis were located only within the MWRA sewerage service area. This criterion was adopted in recognition of an MWRA Board of Directors policy vote in August of 1986. However, certain coastal sites that had been identified in Phase I are located outside of the service area. In keeping with the general direction provided in the Special Procedure, these sites were carried forward into the Site Screening Analysis.

In addition, the Technology Assessment evaluated the availability of disposal capacity outside of the service area. Existing facilities examined included resource recovery facilities, landfills, and other facilities currently accepting sludge.

Preliminary results of the Technology Assessment were reviewed to define minimum acreage requirements. Minimum acreage cutoffs were defined based on the least land-intensive technology requirements. The minimum acreage requirements used in the site identification process were:

- five (5) acres for a coastal site; and
- eight (8) acres for an inland site.

The only other site feature factored into the site identification criteria was development status. Sites with building development in active use were not considered. Sites meeting the geographic and minimum acreage requirements which were undeveloped, vacant, or potentially underutilized (e.g., parking lots) were included in the site universe.

b. Site Identification Methodology. The 200+ sites identified in Phase I, which met the minimum acreage and development status criteria discussed above, were included in the site universe. The Phase I site listing was augmented with sites from the following sources:

- sites identified at public meetings during Phase I as having been overlooked;
- available parcels identified using the Metropolitan Area Planning Commission (MAPC) data resources;
- sites identified through discussions with the General Services Administration and Massachusetts Division of Capital Planning;
- sites identified by C.E. Maguire as part of the MWRA On-Shore Water Transportation Facilities Assessment;
- sites identified through review of information at assessors' offices within the MWRA service area communities;
- sites identified through review of Massachusetts Department of Environmental Quality Engineering (DEQE) lists of potentially contaminated locations ("21E" Sites);
- sites identified through review of DEQE files on active and closed landfill sites; and,
- vacant land parcels identified during field verification of the site universe data base.

Potential sites from the above sources which met the geographic, minimum acreage, and development status criteria were added to the site universe. The site bank resulting from this effort consisted of 299 sites.

2. Site Screening Methodology

As discussed in the Introduction, a primary objective of the Site Screening Analysis was to screen the 299 site universe

to an ordered listing of sites based on relative environmental and technical suitability for one or more of the major residuals program functions. The methodology developed to screen the site universe to an ordered listing entailed the following major steps:

1. A set of site screening criteria were developed in close coordination with MWRA staff, DEQE, and EPA. The criteria focused on site features that could be used to distinguish differences in site capabilities.
2. A numerical suitability scale was developed for each screening criterion. The suitability scales represent a means to assign a separate score to each site for each criterion, (0 = least suitable, 10 = most suitable), based on tangible site features.
3. A set of weighting factors were developed that specified the relative importance of each individual screening criterion in determining overall site suitability.
4. A data base was developed for each site through review of published information and completion of field surveys.
5. The suitability scales and corresponding weighting factors were applied to the data base to develop a suitability score for each site.
6. Sites were ordered from most potentially favorable to least potentially favorable based on the weighted suitability scores.
7. Since the results of the field surveys indicated that a number of the higher ranking sites were recently developed or actively under construction, land use codes reflecting development status were assigned to each site. Sites were then reordered placing developed sites (or those under active construction) below undeveloped sites in the site ordering.

More detailed information on each of the above steps is provided in the remainder of this section.

a. Site Screening Criteria. The selection of the screening criteria built upon the efforts of the Phase I analysis and the experience of the project team in the performance of large siting studies. In order to ensure consistency with the goals of MEPA, the Environmental Impact Report (EIR) regulations regarding the outline and content of a project impact assessment (301 CMR 11.07) were reviewed. Particular attention was placed on MEPA requirements regarding the description of the environment in the area likely to be affected by a proposed project.

A total of ten (10) screening criteria were selected. Within each criterion, several site evaluation features were identified for use in ascertaining differences in site suitability:

- Engineering Considerations
  - Base soil type and characteristics
  - Topography
  - Depth to bedrock
  - Potential for on-site contamination
- Noise Environment
  - Proximity to sensitive noise receptors
  - Proximity to existing major noise sources
- Land Use
  - Current site use
  - Neighboring land use
  - Proximity to sensitive receptors
  - Community development objectives
- Cultural Resources
  - Proximity to historical resources
  - Proximity to archeological resources

- Transportation/Traffic
  - Site rail access
  - Site coastal access
  - Site roadway access
  - Current traffic conditions

- Surface Water
  - Proximity to water bodies
  - Proximity to 100 year flood zones
  - Water quality classification

- Ground Water
  - Aquifer presence
  - Well yield potential
  - Proximity to drinking water wells

- Wetlands
  - Presence of on-site wetlands
  - Proximity to off-site wetlands

- Ecology
  - Presence of threatened or endangered species
  - Terrestrial ecological habitats
  - Aquatic ecological habitats

- Air Quality/Odors
  - Impact area characteristics
  - Dispersion characteristics
  - Existing air quality and emissions sources

b. Development of Site Suitability Scales. A numerical scoring system was developed to enable an objective and consistent ordering of sites based on their relative suitability for use in the RMFP. For each of the screening criteria discussed above, a site suitability scale was developed. The site suitability scales reflect separate ranges of numerical scores (0 to 10) for each of the site screening criteria. In applying the site suitability scales: a "0" score represents the least suitable set of site features expected; a "5" score represents the anticipated average set of site features; and, a "10" score represents the most suitable set of site features expected.

The suitability scales are intended to allow a comparison of each site against all others in the universe. The suitability scales used in the site screening analysis are presented in Appendix A.

c. Development of Weighting Factors. An attitudinal survey was administered to solicit input from a broad based group on the relative importance of the ten site screening criteria. A copy of the attitudinal survey instructions and survey form are provided in Appendix B.

The attitudinal survey was administered to three distinct groups of individuals: (1) the Citizens Advisory Committees (CAC), (2) a group of RMFP Technical Advisors assembled at a workshop held in November 1986, and (3) MWRA staff attending a site screening methodology briefing in November 1986. In the survey, each participant allocated a total of 100 points to the 10 screening criteria. The results of the surveys were used to develop weighting factors for each of the screening criteria. In developing an overall suitability score for each site, the raw suitability scores were adjusted to reflect the weighting factors.

d. Development of the Site Inventory Data Base. The Site Screening Analysis drew upon the most current published information that was consistently available for the geographic study area. To ensure that the analysis was based upon the most current and accurate data available, a field survey program of all 299 sites was undertaken. The field surveys focused on verification of the published environmental data pertaining to the site and adjacent areas. The field surveys also served as a mechanism for defining the current land use status of the sites.

To consistently compile information for each site in the Site Universe, a Data Inventory Form was developed. The forms were completed for all 299 sites in the universe. The form, a copy of which is provided in Appendix C, was organized around the following data sources:

- U.S. Geological Survey Topographic Quadrangles (7.5 minute series)
- U.S. Fish and Wildlife Service National Wetlands Inventory Maps
- Federal Emergency Management Agency Flood Insurance Rate Maps
- Metropolitan Area Planning Council 1980 Land Use Maps
- Local Zoning Maps
- Massachusetts Department of Environmental Quality Engineering Aquifer Maps
- Massachusetts Department of Environmental Quality Engineering Waste Source Maps
- Massachusetts Department of Environmental Quality Engineering Ambient Air Quality Standards Attainment Status listings
- U.S. Soil Conservation Service Soil Surveys
- Massachusetts Natural Heritage Program information on threatened or endangered species
- Massachusetts Historical Commission data on historical and archeological resources
- Project team field survey results

A comprehensive list of all data resources utilized in the Site Screening Analysis appears in the Bibliography.

e. Site Suitability Scoring. A team of professionals experienced in the various fields represented by the site suitability screening criteria (meteorologists, geologists, land use planners, ecologists, etc.) was assembled. The panel assigned separate suitability scores to each site for each of the ten screening criteria using the information sources previously described in Section d.

Once each site had been assigned a separate score (ranging from 0 to 10) for each screening criterion, an overall (weighted) suitability score was computed for each site. The weighted suitability score was calculated by applying each individual criterion's suitability score with the appropriate weighting factor. Total scores for each site were then computed by adding the individual weighted scores. The result was a maximum potential score of 100 points for each site.

f. Initial Site Ordering. The site universe was ordered based on the overall (weighted) suitability scores. Sites were ordered with respect to suitability for supporting a residuals management program function.

g. Site Reordering Based on Development Status. Since during the field survey verification process considerable new development (on approximately 60 sites) was noted, an adjustment to the initial ordering was required. This adjustment was completed using the following coded criterion:*

On-Site Land Use Codes

A-1:	State Park;
A-2:	Town Park or designated Conservation Land;
B-1:	Existing, developed site use (ongoing) and/or new development under construction;
B-2:	Low intensity existing site use (i.e. quarry, park-ride, warehouses, drive-in theaters);
B-3:	Abandoned, existing land use (i.e. abandoned warehouses):
C-1:	Vacant Land.

Once the on-site land use codes were established, the sites were sorted by a separate land use ranking. The

*If an adequate number of undeveloped or abandoned acres (i.e. > 8 inland, > 5 coastal) on an otherwise developed site existed, the site was coded according to the undeveloped or abandoned portion of the site.

site universe was separated into two groups. The first group consisted of sites with land use codes of A-1, A-2, B-2, B-3, and C-1. The second group consisted of sites coded B-1. The B-1 site group was placed below the first group in the site ordering. Within each of the groupings, the sites were ordered by their previously assigned weighted score value.

C. TIER 2 SITE SCREENING ANALYSIS

1. Objectives of Tier 2 Site Screening

The Tier 2 Site Screening Analysis is an integral part of the Candidate Options Identification phase of the RMFP. The Candidate Options Identification phase of the RMFP brings together the results of the residuals characterization, technology assessment, transportation assessment, and site screening analysis to develop complete residuals management alternatives that will be further analyzed in the Candidate Options Evaluation (Tier 3). This comparative evaluation will be used to identify a preferred candidate option and one or two alternates for more detailed analysis in the Final Options Analysis (Tier 4).

The approach to develop candidate options is based on defining alternatives that "make sense" from a "systems" point of view, rather than identifying several "good" sites and letting the site characteristics drive the development of alternatives (e.g., what residuals management program could be developed around a specific site). These residuals handling and processing system alternatives established the specific siting needs, such as site size, buffer area, and transportation requirements. The objectives of the Tier 2 Site Screening Analysis were to determine the siting needs for each System Alternative and develop a separate ordered list of sites for each component use.

2. Tier 2 Site Screening Approach

The Tier 2 Site Screening Analysis entailed the following major steps:

1. The RMFP components, or site types, needed to fulfill the Candidate Options system alternatives were identified. For each site type, minimum space requirements were determined.

2. Net usable area was calculated for each site in the site bank by "netting out" potentially undevelopable areas (e.g., water bodies, severe slopes, etc.). Net available area for each site was compared to minimum area requirements for each component use. Separate site lists were developed for each component use. All sites that met the minimum acreage requirement for a component use were included on the list for that use.

3. Technology-specific weighting factors were developed for each component use based on the relative importance of each of the site screening criteria in determining overall site suitability for that specific use.

4. The technology-specific weighting factors were applied to the Tier 1 suitability scores to derive technology-specific suitability scores for each component use. Separate ordered lists were developed for each component use based on the technology-specific suitability scores.

Each of these steps is further explained below.

a. RMFP Component Site Types. The following RMFP components comprise the system alternatives identified in the report: Candidate Options Identification (Black & Veatch 1987).

- Coastal Transfer Sites
- Coastal Combustion Only Sites
- Inland Combustion Only Sites
- Coastal Composting Only Sites
- Inland Composting Only Sites
- Coastal Combustion and Composting Sites
- Inland Combustion and Composting Sites
- Inland Landfill Sites

b. Net Acreage Evaluation. For each of the 299 sites comprising the site universe, net usable area was calculated by identifying potentially "undevelopable" portions of each site (e.g., developed area, surface water bodies, significant wetland areas, or severe slopes). These net available area estimates were then compared to minimum site area requirements for the above RMFP component uses. Separate lists of sites which satisfied the minimum acreage requirements were developed for each RMFP component use.

c. Development of Technology-Specific Weighting Factors. Separate technology-specific weighting factors were developed for each of the above RMFP component uses. These technology-specific weighting factors serve to amplify the importance of certain Tier 1 suitability criteria and deemphasize others based on the specific program use under consideration. The technology-specific weighting factors range from 1, low importance, to 5, high importance.

d. Technology-Specific Suitability Scoring. The technology-specific weighting factors were applied to the Tier 1 suitability scores to derive, for each site, a separate technology-specific suitability score for each RMFP component use. Based on the technology-specific suitability scores, separate ordered lists (from most suitable to least suitable) were formed for each of the eight RMFP component uses identified above.

It is from the Tier 2 ordered lists that sites were selected for combination with system alternatives to produce the initial listing of Candidate Options. The matching process and resulting Candidate Options are discussed in the report: Candidate Options Identification (Black & Veach 1987).

D. USERS GUIDE TO SITE SCREENING ANALYSIS AND CANDIDATE OPTIONS IDENTIFICATION

A User's Guide which describes the principal steps in the Site Screening Analysis and Candidate Options Identification processes, and where in the respective reports detailed information about each step can be found, is presented in Table ES-2.

TABLE ES-2

USERS GUIDE

SITE SCREENING ANALYSIS AND

CANDIDATE OPTIONS IDENTIFICATION METHODOLOGIES

The following describes the principal steps in the Site Screening Analysis and Candidate Options Identification Processes and where in the respective separate reports the detailed information about each step can be found.

Step	Site Screening Reports	Candidate Options Identification Report
Identification of the Site Universe	Chapter 1	
Develop Initial Site Screening Criteria	Pages 2-3 - 2-12 Table 2-1 Appendix A	
Establish Suitability Scale for Site Evaluation Features (sub-criteria of Initial Site Screening Criteria)	Pages 2-12 - 2-13 Table 2-2	
Develop attitudinal survey weighting factors; (opinions from public regarding relative importance of each screening criterion)	Page 2-13 Figures 2-1, 2-2 Tables 2-3, 2-4	
Collect and field verify existing data on all 299 sites	Chapter 3	
Score 299 sites (results in raw scores for each of 10 criteria, raw total scores, and total score weighted by results of attitudinal survey)	Chapter 4; Volume II, Results	
Order sites (1-299) based on suitability scores	Chapter 4; Volume II, Results	
Sites re-ordered based on current development status.	Chapter 4; Volume II, Results	
Develop technology specific weighting factors (coastal transfer/dewatering combustion, composting, landfill).	Chapter 5 Table 5-1	

TABLE ES-2 (Continued)

USERS GUIDE

Step	Site Screening Reports	Candidate Options Identification Report
Sort all sites by acreages for four residuals functions: coastal transfer and dewatering (5); combustion only (8); composting only (25); composting and combustion (30); landfill (100).	Chapter 5 Figure 5-1	Chapter 2
Apply technology specific weighting factors to appropriate lists.	Table 5-1 Page 5-14	
Produce 8 technology-specific ordered lists from which sites were selected using Site Selection Factors.	Volume II, Results	Chapter 2
Summarize results of initial three reports (Residuals Characterization, Technology Assessment, Transportation Assessment) to develop technical conclusions and develop systems alternatives for residuals management.		Chapter 1
Develop 7 Factors for Selection of Sites to form Candidate Options (ranking, flexibility, compatibility, transportation access, permitting feasibility, development status, variety of sites.		Chapter 2
Using Selection Factors, select small number of sites from 8 Chapter 2 ordered technology-specific lists to be matched with 7 system alternatives.		Chapter 2
Describe 31 Candidate Options (Full technology/transportation alternatives) for further detailed evaluation in next phase, Candidate Options Evaluation.		Chapter 3

INTRODUCTION

BACKGROUND

The Residuals Management Facilities Plan (RMFP) is one of a series of related efforts by the Massachusetts Water Resources Authority (MWRA) to improve the environmental, aesthetic, and recreational quality of Boston Harbor, Massachusetts Bay, and the coastal communities of eastern Massachusetts. The primary focus of the RMFP effort is planning for the long-term collection, processing, transportation and disposal or beneficial reuse of residual materials from the future MWRA wastewater treatment facilities that will serve the Greater Boston area.

The current effort is the second phase of a staged planning process, and is intended to build upon the results of the previous work. A report on the Phase I work was filed with the Executive Office of Environmental Affairs (EOEA) in December, 1985. It documented existing conditions in the MWRA service area, projected future conditions, reviewed potential locations for siting residuals management facilities, and recommended a number of technology "process trains" for future evaluation in Phase II of the planning effort.

In the Environmental Notification Form (ENF) filed for this project in December, 1985 the MWRA requested that the residuals management project be designated as "Major and Complicated" under the provisions of the Massachusetts Environmental Policy Act (MEPA). In granting the request, the Secretary of Environmental Affairs in late February 1986 established a "Special Procedure" for completion of the RMFP during Phase II.

Following a period of consultant evaluation and selection, work began in late August 1986 on Phase II of the RMFP in accordance with the Special Procedure. This report on the Site Screening Analysis is one of several reports to be developed during this stage of the planning process.

OBJECTIVES

As a significant part of the RMFP effort, the MWRA needs to identify, and then evaluate, potential sites for new facilities that will process the residuals that are a byproduct of treating municipal wastewater. In a manner that is consistant with the requirements of the Special Procedure issued by the Secretary of Environmental Affairs for development of the RMFP, the siting process is being conducted in four "tiers" or stages as listed in Table 1.

Tier 1 in the overall siting process is referred to as the Site Screening Analysis. The primary objectives of the Site Screening Analysis were to: (1) identify and assemble data on a universe (~ 300) of candidate sites and, (2) to screen those sites in as objective, consistent and defensible a manner as possible to an ordered listing of sites based on relative environmental and technical suitability as locations for one or more of the major residuals management program functions. This will provide an unbiased means of selecting a smaller subset of locations for consideration as potential sites in Tier 2, the Candidate Options Identification phase of the RMFP analysis. It was also an objective of the Site Screening Analysis to provide adequate opportunity for the MWRA Board of Directors, the involved regulatory agencies, and Citizens Advisory Committees (CAC) to review interim results throughout the process, and participate directly in the site screening effort.

In keeping with the requirements of the Special Procedure, the Tier 1 Site Screening Analysis was conducted independent of any consideration of a specific residuals management technology. The objective of Tier 2 in the RMFP siting process was to refine the Tier 1 site ordering to a set of technology-specific lists. This portion of the siting process, which is part of Candidate Options Identification on Table 1, incorporates the site requirements of the specific residuals management technologies that will be used to formulate complete

TABLE 1

RMFP SITING PROCESS EVALUATION TIERS

	Evaluation Tier	Beginning Point	Key Steps	Result
1.	Site Screening Analysis	~300 sites	• site ordering through screening process	ordered list of sites
2.	Candidate Options Identification	ordered list of sites	• site acquisition evaluation • merge sites and technologies	small number of candidate options (sites and technologies
3.	Candidate Options Evaluation	small number of candidate options (sites & technologies)	• environmental and engineering assessment	1 preferred RMFP option and 1-2 alternates
4.	Final Options Analysis	1 preferred RMFP option and 1-2 alternates	• refined site specific engineering and environmental review	Final selection of option for implementation

Source: Black & Veatch, ERT, 1987.

residuals management alternatives (technologies, sites, and transportation systems) to be further analyzed in the Candidate Options Evaluation (Tier 3).

TECHNICAL APPROACH OVERVIEW

Tier 1

The activities comprising the Tier 1 Site Screening Analysis were organized into ten tasks. A flow chart illustrating the Site Screening Analysis process is presented in Figure 1. A summary of the major steps, or tasks, is provided below:

1. Review Phase I work and identify major data sources that provide information on potential site locations to enable differentiation of site capabilities.
2. Establish a data base management system to allow efficient organization and handling of the site data, ensure that consistent data are maintained for all sites, and allow easy identification of any data gaps.
3. Present a series of workshops (MWRA staff, Board, CAC, regulatory agencies, other interested groups) to provide information and solicit input on the siting process and criteria.
4. Develop site identification criteria that define minimum requirements for a potential site to be considered for use in the residuals management facilities plan.
5. Based on the identification criteria, define the universe of potential sites.
6. Develop site screening criteria based on experience, engineering judgement, applicable environmental and public health regulations, and stated preferences and policies of the MWRA. The objective of applying the criteria was to ascertain differences in the suitability for supporting residuals management facilities.

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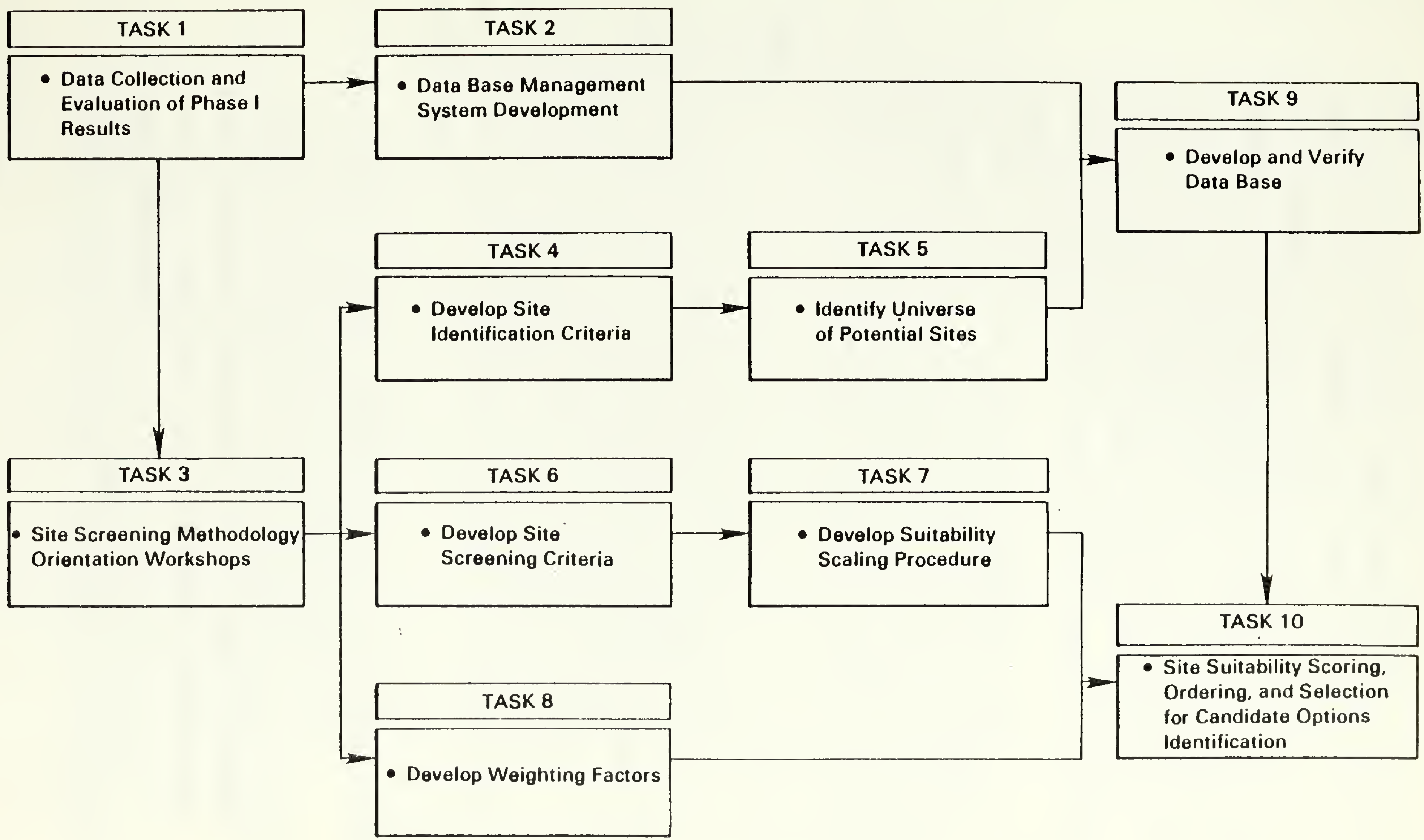

Figure 1 Site Screening Analysis (Tier 1) Process Diagram

7. Establish a scale that relates criteria to suitability for siting. The result was a suitability scale for each criterion (0 = least suitable, 10 = most suitable).
8. Develop weighting factors that specify the relative importance of each screening criterion in determining the overall suitability of a site. These weighting factors were developed by soliciting opinions on the relative importance of the criteria, by means of an attitudinal survey conducted during the workshops listed in Task 3.
9. Develop, and verify by field inspection, the necessary data on the site universe that enabled evaluation of the relative suitability of each site.
10. Order the sites from most suitable to least suitable based on the technology-independent siting criteria.

Tier 2

The Tier 2 Site Screening Analysis is part of the Candidate Options Identification phase of the RMFP. As discussed in the report: Candidate Options Identification (Black & Veatch 1987), several system alternatives were developed to be matched with sites to formulate Candidate Options for further evaluation. As further discussed in Chapter 5, the Tier 2 Site Screening Analysis entailed the following steps:

1. Determine the RMFP components, or site types, needed to fulfill the system alternatives and their respective minimum size requirements.
2. Calculate net usable area for each site in the site bank and develop separate lists for each component use of all sites that meet the respective minimum size requirements.
3. Develop a set of technology-specific weighting factors for each component use based on the relative

importance of each of the Tier 1 screening criteria in determining overall site suitability for each specific use.

4. Apply the technology-specific weighting factors to the Tier 1 site suitability scores to derive technology-specific suitability scores for each component use. Develop separate ordered lists of sites for each component use based on the technology-specific site suitability scores.

REPORT OBJECTIVES

The primary objective of this report is to describe the Tier 1 and Tier 2 Site Screening Assessment methodologies. Included are discussions of: the criteria and data sources used to assemble a universe of potential site candidates; the criteria and process used to screen the universe of sites into an ordered list based on potential suitability to accommodate a residuals program function; the data sources and field verification program used to assemble the necessary environmental, cultural, and engineering data that enabled evaluation of the relative suitability of each site; and, how the results of the Tier 1 Site Screening Analysis were used in Tier 2 to select sites for inclusion in Candidate Options.

Chapter 1 of this report discusses the development of the site universe. The site identification methodology, criteria and data sources are presented. Chapter 2 discusses the Tier 1 site screening process. It includes a presentation of the site screening methodology, the screening criteria, a numerical suitability scoring system used to order sites, and the weighting factors that specify the relative importance of each screening criterion in determining the overall suitability of a site.

The site inventory data base is discussed in Chapter 3. Included are discussions of the data sources used to assemble information on each site, the field investigation program that

was undertaken to verify and augment the site data, and the data base management system implemented to ensure accurate and efficient handling of the site data. Chapter 4 discusses the site scoring process and presents details on how an ordered list of sites was developed based on relative site suitability. Chapter 5 discusses Tier 2 of the Site Screening Analysis. It describes how the technology-independent site lists were reordered to reflect technology-specific size, engineering and environmental requirements.

The results of the Site Screening Analysis are detailed in Volume II of this report. Volume II includes identification of all sites in the site universe, results of the technology-independent and various technology-specific orderings and detailed descriptions of each site selected for analysis in the Candidate Option Evaluation. The process used to select, from the Tier 2 technology-specific lists, the recommended sites for inclusion in the Candidate Options Evaluation is discussed in the report: Candidate Options Identification (Black & Veatch 1987).

CHAPTER 1
SITE UNIVERSE

INTRODUCTION

The first step in the Site Screening Analysis was to identify a universe of candidate sites for evaluation. The Phase I site screening drew considerably more comment than did the technology assessment. For this reason, the Secretary of Environmental Affairs required that: (1) the screening of the approximately 200 sites considered in Phase I be reexamined; (2) an effort be undertaken to identify new sites that may have been overlooked in the Phase I efforts; (3) the site screening analysis proceed essentially independently of the technology assessment; and, (4) coastal, inland, and island sites be treated and screened equally for all potential technology blocks.

This chapter discusses the site identification criteria used in the Site Screening Analysis, and describes how the universe of potential site candidates was developed.

SITE IDENTIFICATION CRITERIA

The first step in identifying candidate sites was the development of site identification criteria. The Phase I analysis was reviewed as part of this effort, and the 200+ sites identified in Phase I formed the nucleus of the site universe. Identification criteria were an integral part of the planning efforts directed towards augmenting the Phase I site listing with additional potential sites that could be utilized for either sludge transfer, processing, or ultimate disposal. Recognizing that at this stage of the analysis no specific technologies had been selected, and that sites will be required for all aspects of whatever technologies are eventually selected, site identification criteria had to be nonrestrictive. Identification criteria focused on minimum

suitability requirements for sites applicable to any potential technology or supporting component of any potential technology (e.g., transfer station, dewatering location, etc.).

Site Location

In recognition of the MWRA Board policy vote in August, 1986, the geographic area considered for identifying new sites to be added to the Phase I site universe was the MWRA service area. The Phase I site universe, however, included some coastal locations that were outside of the MWRA sewerage service area. In recognition of EOEA's Special Procedure, which directed that all Phase I sites be reconsidered, these locations were maintained within the site universe. In the Technology Assessment, capacity outside of the service area, in the form of existing facilities was examined. These included landfills, municipal solid waste (MSW) incinerators capable of accepting sludge or capable of modification to accept sludge, or any other facility currently accepting sludge. Some work had been previously undertaken in identifying such facilities, under MWRA direction, by Stone and Webster in the 1985 Interim Sludge Disposal Study. This study served as the starting point in identification of existing sites with excess capacity. It was determined that very few such facilities currently exist, although a number of new resource recovery facilities are in the early planning stages. Information was sought to identify any facilities currently planning co-disposal of MSW and sludge.

Minimum Size Requirements

Preliminary results of the Technology Assessment identified minimum size requirements for each of the candidate technologies being evaluated. To avoid being preemptive or overly restrictive, the minimum size requirements of the least land intensive technologies were selected. The minimum size requirements were:

- Eight (8) acres for an inland site
- Five (5) acres for a coastal site

The small minimum area for a coastal site reflects consideration of coastal transfer only locations. Otherwise, for any given technology, minimum acreage requirements would not vary significantly between inland and coastal locations.

Other Site Characteristics

A number of site characteristics which were felt would preclude or severely restrict use of a site for any residuals program management function were considered. These "fatal flaw" characteristics entailed engineering or regulatory obstacles that would impair the usefulness of sites in the RMFP.

After careful review of the proposed "fatal flaw" characteristics, it was determined that their inclusion would be inconsistent with the Special Procedure guidance that the criteria not be overly restrictive and preemptive, and that the broadest possible consideration of sites be ensured. Therefore, the only characteristic factored into the site identification criteria was development status. Developed sites, those with existing building development in active use, were not considered. Sites which were undeveloped, vacant, or potentially underutilized (e.g., parking lots) were considered viable. Failure to rule out existing viable uses would have resulted in the consideration of virtually every parcel of land within the MWRA service area.

SITE IDENTIFICATION METHODOLOGY

Per the directions of the Special Procedure, all of the sites identified in the Phase I analysis were reconsidered in the Site Screening Analysis. The 200+ sites identified in Phase I were evaluated against the minimum size and development status criteria discussed above. Those that met the minimum size and development status requirements were carried forward

into Phase II. It was also important to include in the universe of sites potential locations that were identified at the public meetings held during Phase I. The basis for the identification of these sites were the minutes of the public meetings held in January 1986 on the Phase I results. Meeting minutes on file at MWRA offices were reviewed for the identification of sites which were reported to have been overlooked in Phase I.

Using the site identification criteria discussed above, the Phase I site listing was augmented with locations identified through the following steps. The Metropolitan Area Planning Commission (MAPC) was contacted in an attempt to identify additional site candidates. Discussions were held with MAPC staff and the MAPC real estate and land use files were reviewed. All available parcels identified by the MAPC which were not in the Phase I inventory were added to the site universe.

In accordance with the Special Procedure, both the Massachusetts Division of Capital Planning (DCP), who have data on landbanked Commonwealth-owned sites, and the General Services Administration (GSA) who have data on landbanked Federally-owned sites, were consulted to identify any currently unused lands that might be suitable for siting of residuals management facilities. All parcels identified by those agencies which met the minimum size criteria were added to the site universe.

In a related study conducted by C.E. Maguire, under contract to the MWRA, <u>On-Shore Water Transportation Facilities Assessment</u>, several coastal sites were evaluated for potential use as staging areas for construction materials during the upcoming construction of new wastewater treatment facilities on Deer Island. Sites identified in this study which met the minimum size requirements were added to the site universe.

Each of the MWRA communities' assesor's offices were visited. Through discussions with community planners and

review of land use and tax maps, attempts were made to identify potential parcels which met the minimum size requirements. Particular emphasis was placed on large parcels of undeveloped land which may have been overlooked in Phase I. These meetings also served to verify data on parcels already in the site bank. To avoid unduly alarming these communities, the assessors' office visits were conducted anonymously.

Massachusetts Department of Environmental Quality Engineering (DEQE) data on potentially contaminated (21E) sites were reviewed, since many of these sites are recently abandoned industrial locations. A list of "21E" sites which met the minimum size requirements was assembled and compared against the site universe listing. Those sites not already included in the site universe were added.

DEQE data on active and closed landfills, both within and outside of the MWRA service area, were reviewed to identify existing landfills which might have excess capacity or recently closed landfills capable of expansion.

Finally, during the field verification of the site inventory data base, discussed later in Chapter 3, potentially suitable parcels noted by the field crews were investigated. Those which met the minimum size requirements were added to the site universe.

CHAPTER 2
SITE SCREENING ANALYSIS

OBJECTIVES

The primary objectives of the Tier 1 Site Screening Analysis were to identify and assemble data on a universe of candidate sites and screen those sites in as objective, consistent and defensible a manner as possible to an ordered listing of sites. The screening was based on each site's relative environmental and technical suitability as a location for one or more of the major residuals program functions (e.g., coastal transfer site, composting site, etc.).

There are a number of different technologies, from composting and land disposal to combustion, that can be employed to manage wastewater treatment residuals. A site that is suitable for one type of technology may not be appropriate for another type of technology, and vice-versa. In accordance with the Special Procedure established by the Secretary of Environmental Affairs, the Tier 1 Site Screening Analysis did not take into account whether any given site is more or less well suited to a particular technology. Rather, the Tier 1 site screening was technology-independent. In Tier 2 of the site screening analysis, (as discussed in Chapter 5 and the Candidate Options Identification Report) technology-specific site reorderings were conducted using technology-specific site suitability criteria. It is from these technology-specific ordered lists that sites were selected for combination with system alternatives to produce the initial list of Candidate Options.

The criteria developed to conduct the Tier 1 (technology-independent) site screening are discussed in this Chapter.

SITE SCREENING CRITERIA

Site screening criteria were developed to enable relative comparisons to be made of the universe of sites (~ 300)based on their ability to accommodate a residuals management facility, independent of any particular technology. The criteria were developed in close coordination with MWRA staff. Valuable input and guidance were also provided in this regard by DEQE and EPA through a series of workshops and their critical review of the Site Screening Criteria Report. The Site Screening Criteria Report, which is provided in Appendix A, was also presented to the Environmental Subcommittee of the MWRA Board of Directors for review and comment.

The screening criteria focused on the identification of site features (e.g., topography, soil types, proximity to residential areas, etc.) that could be used to effectively distinguish differences in site capabilities. The selection of the screening criteria built upon the efforts of the Phase I analysis and the experience of the project team in the performance of large siting studies. In order to ensure consistency with the goals of MEPA, the Environmental Impact Report (EIR) regulations regarding the outline and content of a project impact assessment (301 CMR 11.07) were reviewed. Particular attention was directed to MEPA requirements regarding the description of the environment of an area likely to be affected by a proposed project. The regulations call for a discussion of the physical, biological, economic, and social conditions of a site, its immediate surroundings and the region. Characteristics typically discussed include:

(a) topography, geology, and soils;
(b) surface and ground water hydrology and quality;
(c) plant and animal species and ecosystems;
(d) traffic, air quality, and noise;
(e) scenic qualities, open space, and recreation resources;

(f) historical and archeological resources;

(g) the built environment and use of the area; and

(h) rare or unique features of the site and its environs.

Based upon the above review, a total of ten (10) screening criteria were identified. Within each criterion, several site evaluation features, or subcriteria were identified for use in ascertaining differences in site suitability. The screening criteria and corresponding site evaluation features are provided in Table 2-1. A brief discussion of each of the screening criteria follows.

Engineering Considerations

From an engineering perspective, a number of geological/ soils considerations differentiate sites in terms of suitability. For example: sites with severe slopes would have limited development potential; those with moderate slopes may be developable, but may entail extensive excavation and grading; those with mild slopes would be more ideal. Similarly, sites dominated by organic soils may require substantial amounts of fill to support foundations; those with bedrock near the surface may require extensive blasting; and, those previously contaminated by hazardous waste may require costly cleanups prior to development.

Evaluation of sites relative to the Engineering Considerations criterion focused on the following site features:

- Base soil in terms of suitability for foundations and drainage characteristics;
- The site topography;
- Depth to bedrock as it may affect the need for, and extent of blasting; and,
- Previous contamination of the soil.

TABLE 2-1

SCREENING CRITERIA AND SITE EVALUATION FEATURES

Screening Criteria	Site Evaluation Feature
Engineering Considerations	• Base soil type and characteristics • Topography • Depth to Bedrock • Potential for on-site contamination
Noise Environment	• Proximity to sensitive receptors • Proximity to existing major noise sources
Land Use	• Current site use • Neighboring land use • Proximity to sensitive receptors • Community development objectives
Cultural Resources	• Proximity to historical resources • Proximity to archeological resources
Transportation/ Traffic	• Site rail access • Site coastal access • Site roadway access • Current traffic conditions
Surface Water	• Proximity to water bodies • Proximity to 100 year flood zones • Water quality classification
Ground Water	• Aquifer presence • Well yield potential • Proximity to drinking water wells
Wetlands	• Presence of on-site wetlands • Proximity to off-site wetlands
Ecology	• Presence of threatened or endangered species • Terrestrial ecological habitats • Aquatic ecological habitats
Air Quality/Odors	• Impact area characteristics • Dispersion characteristics • Existing air quality and emissions sources

Source: ERT, 1987

Noise Environment

In assessing the suitability of a site from a noise perspective, the following three elements are important:

- Who will be exposed to (or receive) the noise?
- What levels of noise are they currently exposed to?
- What are the characteristics of the noise transmission path?

The location of a noise source in relation to the location of a noise-sensitive land use is a critical factor in determining the potential impact of the new noise. Certain land use types (e.g., hospitals or convalescent homes) are much more sensitive to noise than other land use types (e.g., restaurants or bars). Thus, an important consideration in locating a potential noise source is the "noise sensitivity" of surrounding land use types and the presence of particularly sensitive receptors.

The current noise environment is important in locating a noise source since a community's perception of a new noise source will depend on the increase in noise level above ambient. The impact of a new noise source on existing noise levels is a logarithmic function. The higher the existing noise levels, the louder a new noise source would have to be before it would increase the existing noise level. Thus, presence of existing major noise sources (e.g., a highway or a factory) would reduce the perceptible noise impacts of a new source.

Sound propagation from a source to a receiver depends upon the distance to the noise source and the presence of barriers that would attenuate the sound. Any barrier, natural or artificial, that blocks the line of site from the noise source to the receptor will significantly attenuate noise. Thus, important features to examine in evaluating potential sites are distances to sensitive receptors and natural or artificial

barriers that would effectively buffer the site from sensitive land uses.

Land Use

There are both constraints and opportunities associated with a given site and its surrounding land uses. From a MEPA standpoint, a key consideration applicable to all sites will be zoning. Zoning reflects the communities' objectives for land use at a given site. Where town master plans exist, it is expected that they would be relatively consistent with zoning designations. MEPA also requires a baseline and impact assessment of the built environment and man's use of the site, its immediate surroundings, and the region.

MEPA empowers the Secretary of Environmental Affairs to identify, designate and protect areas that are of critical concern. From a land use perspective, eligible areas include agricultural areas and special use areas (undeveloped or natural areas, public recreation areas, or significant scenic sites).

Compatibility with existing land uses in the site vicinity is perhaps the primary land use consideration in siting a facility; however in many cases land use compatibility is also an attribute without clear regulatory standards or regulatory definitions of acceptability.

In determining site land use suitability, factors usually considered in Environmental Impact Assessments include:

- Is the proposed development consistent or of a similar nature with nearby land uses?
- Would land uses in proximity to the site be free of influence from the proposed facility?
- Would the proposed development be consistent with existing and projected land use trends in the community?

- Are neighboring lands intensively used, i.e., are there public institutions, recreation areas, or densely populated areas, in other words, are there sensitive receptors?
- Do land uses in close proximity represent unique resources?
- Would neighborhoods be disrupted or divided by proposed development?

These factors were taken into consideration in developing the land use suitability criteria.

Cultural Resources

Considerations which relate to cultural resources center around the National Historic Preservation Act of 1966 and the Massachusetts General Laws Chapter 9, Section 26c and 27c (950 CMR 71). These laws require that the effect of a development on any district, site, building, structure or object that is included in the National Register of Historic Places shall be taken into account prior to state or federal approval. MEPA also requires consideration of the archaeological or palenteological significance of a site.

On a screening level, the potential historical and archaeological significance of a site may be determined by the following considerations:

1) The presence or absence of sites listed on the National or State Registers of Historic Places, on site or in the site vicinity[1].

[1]The Register includes sites significant in history, architecture, archaeology and culture. It may include districts, sites, buildings, structures, and objects of state or local importance that posses integrity of design, location, setting, feeling and association; are associated with historical events; significant persons; embody the distinctive characteristics of a type, period or method of construction or which have yielded or which are likely to yield, information important in prehistory or history.

2) Proximity to known archaeological resources.

3) Present site use. If the site has no structures on site, but has a history of significant past disturbance indicating soil horizons have been destroyed (e.g., non-agricultural), archaeological or historic resources are not likely to be encountered on site.

Transportation/Traffic

The transportation/traffic criteria is directed towards evaluating the accessibility of sites as determined by the physical and operating characteristics of the existing transportation systems. Consideration is given to three transport modes in the siting analysis: (1) truck access via the highway network, (2) rail, and (3) barge for coastal sites.

The application of the transportation/traffic criteria takes into account the following key issues associated with the transport of residuals from the proposed new wastewater plant to potential processing and disposal facilities:

(1) the proximity of the site locations to the existing highway and rail networks;

(2) the physical condition of the highway facilities serving each site;

(3) the operating capacities of highway facilities;

(4) the current demand on highway facilities;

(5) identifiable physical and/or safety limitations for highway facilities; and,

(6) availability of coastal access.

Surface Water

Water bodies could potentially be affected by stormwater runoff or construction related sedimentation and erosion regardless of residuals management technology. Presence

on-site (or close proximity) of a surface water body may affect the development potential of a site, or limit the number of development options available. In evaluating the on-site presence or proximity of surface water bodies, the 100-year flood zone is considered to be the planning standard within which facilities, in most instances, should not be constructed. These flood zones, as defined by the Federal Emergency Management Administration (FEMA), represent the "high water mark" of surface water bodies over a 100-year period.

In addition to surface water body proximity, two other factors should be considered in siting a facility: the current use and quality of nearby water bodies. Presence of pristine water bodies used for municipal water supply would be more significant than lower quality water bodies used for industrial purposes.

Ground Water

Ground water issues generally considered in siting facilities include the presence or proximity of aquifers or wells, the use of those aquifers or wells, and their yield. Sites underlain with aquifers would be considered less desirable than those without aquifers, as the aquifers could potentially be contaminated with facility-related leachate or, in the case of larger developments, ground water recharge could be affected by the project-related increase in impervious area.

The major federal legislation regarding ground water quality that might be applicable to the implementation of residuals management facility is the Resource Conservation and Recovery Act (RCRA) which specifies requirements for handling any potentially hazardous wastes stored at the site. Subtitle I of RCRA deals with the underground storage tank program (UST) which regulates the storage of hazardous products and substances in underground tanks. Also, EPA is in the process of implementing a national ground water protection strategy which will provide guidelines for the application of RCRA to ground water issues.

On the state level, the Massachusetts Groundwater Discharge Permit Program (314 CMR 5.00) specifies the permit requirements for discharges to ground water. Massachusetts Groundwater Quality Standards (314 CMR 6.00) provides a ground water classification system and water quality standards for each class.

Wetlands

Wetlands represent unique environmental resources requiring particular concern in selecting sites for development. Wetlands can be significant to: public or private water supply; ground water supply; flood control; storm damage prevention; prevention of pollution; and, the protection of fisheries.

The plant communities, soils and associated low, flat topography of wetlands often remove or detain sediments, nutrients (such as nitrogen and phosphorous) and toxic substances (such as heavy metal compounds) that occur in runoff and flood waters.

Some nutrients and toxic substances are detained for years in plant root systems or in the soils. Others are held by plants during the growing season and released as the plants decay in the fall and winter. This latter phenomenon delays the impacts of nutrients and toxins until the cold weather period, when such impacts are less likely to reduce water quality.

Presence of on-site wetlands can limit the development potential of a site. Wetlands offsite but in close proximity to a facility could be affected by stormwater runoff and leachate associated with the site.

Ecology

Key issues with regard to ecology in evaluating site suitability center around the protection of threatened or

endangered species, the protection of terrestial ecological habitat, and the protection of aquatic habitat. The primary law governing the protection of threatened or endangered species and their critical habitat is the Endangered Species Act of 1973. The act provides "... a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved...". Any project which is found to impinge upon critical habitat of species on, or considered for inclusion on, the federal list of protected species must be approved by the U.S. Secretary of the Interior.

Another federal statute, the Fish and Wildlife Coordination Act, provides the Secretary of the Interior with the authority to protect all species of wildlife and their habitat. This law applies particularly to the impounding, diverting, or controlling of waters.

The Massachusetts Wetlands Regulations contain special provisions for the protection of aquatic habitat (310 CMR, 10.56), specifically, land under water bodies and water ways.

Massachusetts General Law C.131 Sec. 41 protects inland waters of the Commonwealth by prohibiting or regulating discharge of waste if fisheries residing in the waters are deemed of sufficient value. Similarly, MGL C.131 Sec. 42 protects fish of inland waters by prohibiting the discharge into Massachusetts waters of any material which may directly or indirectly injure or kill fish or fish spawn.

Air Quality

From an air quality perspective, features that would differentiate sites in terms of suitability would include characteristics of nearby "impact" areas; the dispersion characteristics of a site in terms of surrounding terrain, wind exposure, and ventilation characteristics; the existing air quality, particularly attainment status; and, the presence of nearby major emission sources whose emission plumes could potentialy interact with emissions related to a residuals facility.

The Clean Air Act and Amendments authorize the regulation of both mobile and stationary sources of air pollution, and establish the National Ambient Air Quality Standards (NAAQS). The Massachusetts Air Pollution Control Regulations (Title 310) establish source approval criteria and specific emission limitations applicable to various source types, including Best Available Control Technology (BACT).

The source emission rates of the selected residuals management technology(ies) and the NAAQS attainment status of the host community(ies) will, to a large extent, determine the level of regulatory review. For example, prevention of significant deterioration (PSD) applicability, non-attainment review, the need to achieve emissions offsets, and the applicability of the Massachusetts one-hour NO_2 guideline will depend on source emission strengths and attainment designations. Any proposed emission sources will also have to demonstrate compliance with the Masachusetts Allowable Ambient Levels (AAL's) of toxic air pollutants.

SITE SUITABILITY SCALES

A numerical scoring system was developed to enable an objective and consistent ordering of sites based on their relative suitability for use in the RMFP. For each of the screening criteria shown in Table 2-1, a site suitability scale was developed. The suitability scales reflect separate ranges of numerical scores (0 to 10) for each of the site screening criteria. In each suitability scale: a "0" represents the least suitable set of site features expected; a "5" represents the anticipated average set of site features; and, a "10" represents the most suitable set of site features expected.

For each screening criterion, available data were assembled and reviewed for the site universe. These data, which were verified by field inspection, were used to develop the site suitability scales. Thus, the 0 to 10 scales for each screening criteria represent a means to evaluate the

suitability of a given site relative to all other sites in the site universe rather than against an abstract ideal set of conditions.

As discussed previously, for each site screening criterion from two to four site evaluation features, or subcriterion were identified. The ten points available within each criterion, then, had to be allocated to the various site evaluation features, as shown in Table 2-2. The site suitability scales are detailed in the Site Screening Criteria Report which is provided in Appendix A.

DEVELOPMENT OF WEIGHTING FACTORS

The site suitability scales for each criterion are independent of one another and vary in relative importance in terms of overall site suitability. Therefore, it was necessary to assign weighting factors to the individual criteria based on their relative importance, to develop overall suitability scores.

To develop the weighting factors, an attitudinal survey was administered to solicit opinions on the relative importance of the ten site screening criteria. A copy of the attitudinal survey instructions and survey form are provided in Appendix B.

The attitudinal survey was administered to three distinct groups of individuals: the Citizens Advisory Committees (CAC), a group of Technical Advisors assembled at a workshop held in November, and MWRA staff attending a site screening methodology briefing in November. In the survey, each participant had 100 "weighting points" to allocate to the 10 screening criteria. The results of the survey are shown in Figures 2-1 and 2-2. Figure 2-1 reflects all of the responses received while Figure 2-2 shows the responses of the three individual groups polled. The weighting factors used in determining overall site suitability scores were the mean values of all responses received.

TABLE 2-2

DISTRIBUTION OF SITE SUITABILITY SCALING

POINTS TO SITE FEATURES

Screening Criteria	Site Evaluation Feature	Maximum Points Available
Engineering Considerations	• Base soil type and characteristics	2
	• Topography	3
	• Depth to Bedrock	2
	• Potential for on-site contamination	3
	Subtotal:	10
Noise Environment	• Proximity to sensitive receptors	6
	• Proximity to existing major noise sources	4
	Subtotal:	10
Land Use	• Current site use	3
	• Neighboring land use	3
	• Proximity to sensitive receptors	2
	• Community development objectives	2
	Subtotal:	10
Cultural Resources	• Proximity to historical receptors	6
	• Proximity to archeological resources	4
	Subtotal:	10
Transportation/ Traffic	• Site rail access	2
	• Site coastal access	2
	• Site roadway access	3
	• Current traffic conditions	3
	Subtotal:	10
Surface Water	• Proximity to water bodies	3
	• Proximity 100 year flood zones	2
	• Water quality classification	5
	Subtotal:	10

TABLE 2-2 (Continued)

Screening Criteria	Site Evaluation Feature	Maximum Points Available
Ground Water	• Aquifer presence	2
	• Well yield potential	4
	• Proximity to drinking water wells	4
	Subtotal:	10
Wetlands	• Presence of on-site wetlands	6
	• Proximity to off-site wetlands	4
	Subtotal:	10
Ecology	• Presence of threatened or endangered species	4
	• Terrestrial ecological habitats	2
	• Aquatic ecological habitats	4
	Subtotal:	10
Air Quality/Odors	• Impact area characteristics	3
	• Dispersion characteristics	3
	• Existing air quality and emissions sources	4
	Subtotal:	10
	GRAND TOTAL	100

Source: ERT, 1987.

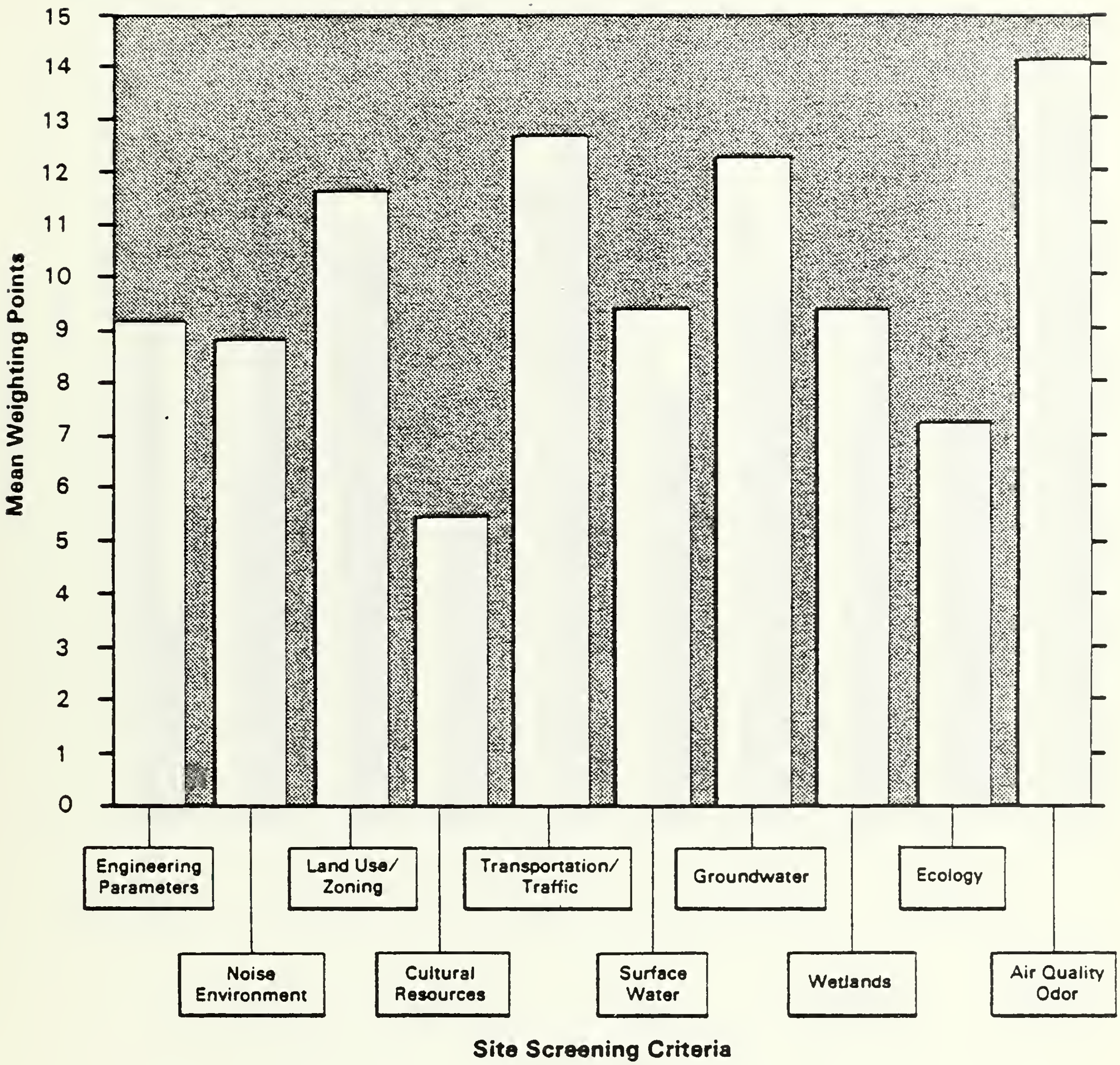

Figure 2-1 Attitudinal Survey Results - All Returns

8703070

Source: ERT, 1987

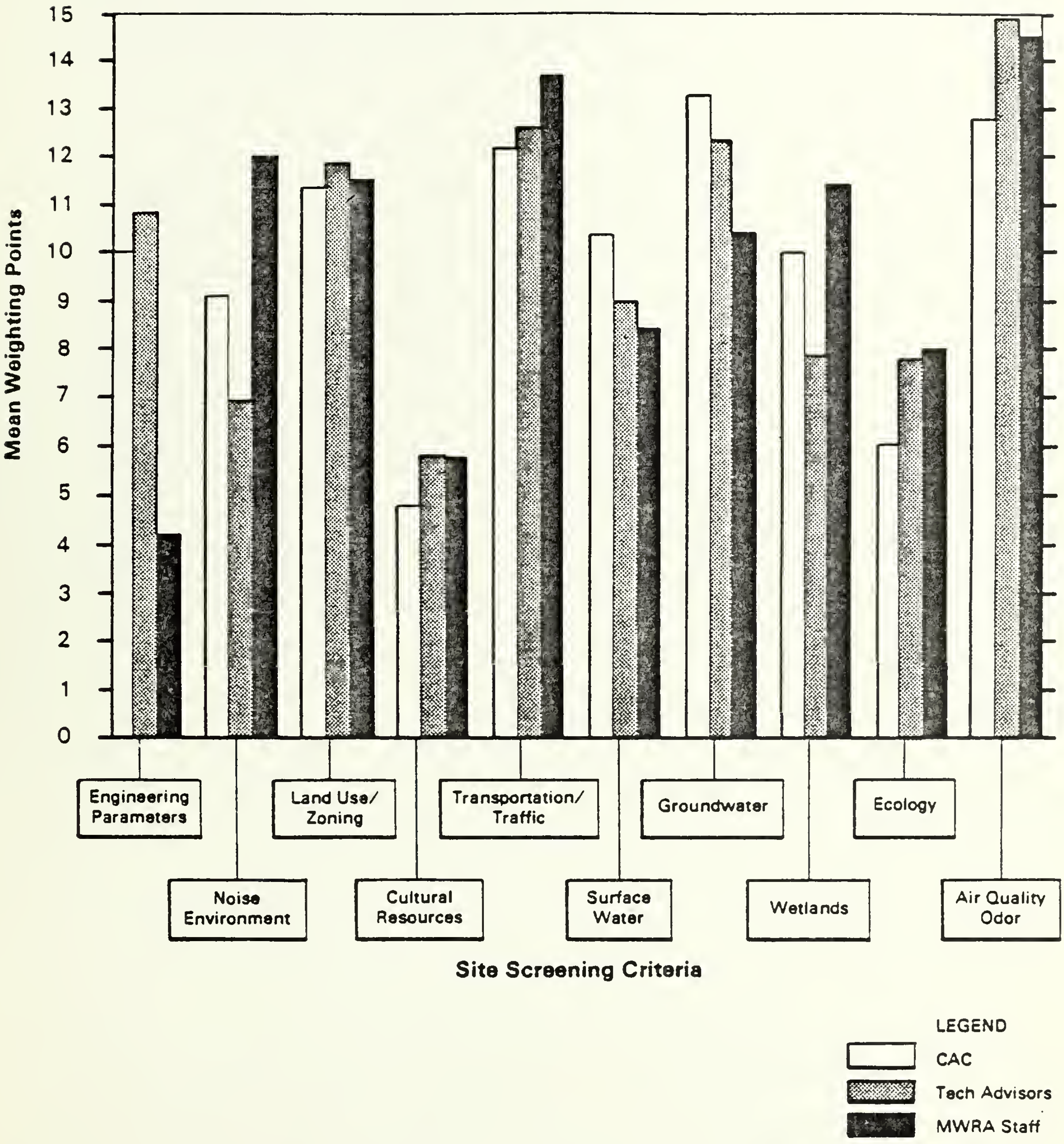

Figure 2-2 Attitudinal Survey Results - By Response Group

8703071

Source: ERT, 1987

In developing an overall, or weighted, suitability score for each site, the raw suitability scores were adjusted to reflect the above weighting factors. The maximum points available for each screening criteria reflecting the weighting factors are shown in Table 2-3. Table 2-4 presents a summary of all attitudinal survey returns.

TABLE 2-3

WEIGHTING FACTORS USED IN THE SITE SCREENING ANALYSIS

Site Screening Criteria	Effective Maximum Score
Engineering Parameters	9.1
Noise Environment	8.8
Land Use	11.6
Cultural Resources	5.5
Transportation/Traffic	12.7
Surface Water	9.4
Ground Water	12.2
Wetlands	9.4
Ecology	7.2
Air Quality/Odors	14.1
Total	100.0

Source: ERT, 1987

TABLE 2-4. SUMMARY OF ATTITUDINAL SURVEY RESULTS - ALL RETURNS.

RESPONSE NUMBER	ENGINEERING PARAMETERS	NOISE ENVIRONMENT	LAND USE/ ZONING	CULTURAL RESOURCES	TRANSPORATION/ TRAFFIC	SURFACE WATER	GROUNDWATER	WETLANDS	ECOLOGY	AIR QUALITY/ ODOR	TOTAL POINTS
1	5	20	10	5	10	5	5	10	10	20	100
2	10	10	10	6	15	8	8	10	8	15	100
3	5	5	5	5	15	10	15	10	15	15	100
4	5	10	5	5	10	15	15	10	10	15	100
5	20	10	15	5	10	10	10	5	5	10	100
6	5	10	8	2	16	10	15	14	2	18	100
7	5	5	15	5	20	5	10	10	5	20	100
8	15	4	10	5	15	10	8	9	9	15	100
9	6	11	11	6	11	11	11	11	11	11	100
10	15	5	15	2	15	10	6	2	10	20	100
11	40	5	15	2	10	10	10	2	2	4	100
12	7.5	2.5	10	2.5	10	7.5	30	7.5	2.5	20	100
13	7	7	20	4	7	4	20	4	7	20	100
14	5	2	15	15	14	6	9	10	9	15	100
15	2	3	20	20	4	8	15	8	15	5	100
16	20	5	5	5	20	10	10	5	5	15	100
17	15	5	5	5	10	15	15	5	10	15	100
18	8	5	20	5	15	8	10	9	5	15	100
19	8	9	8	6	12	12	12	12	9	12	100
20	7	7	9	3	5	15	15	15	15	9	100
21	1	10	10	12	15	12	15	5	5	15	100
22	10	10	20	5	20	5	5	10	5	10	100
23	5	10	30	5	5	5	5	5	5	25	100
24	2	5	2	5	12	10	20	15	4	25	100
25	0	20	0	5	20	10	10	20	7.5	7.5	100
26	5	20	5	5	20	5	10	10	10	10	100
27	0	17	20	6	14	2	2	11	11	17	100
28	5	15	5	5	25	10	5	10	5	15	100
29	8	10	10	6	12	10	8	14	10	12	100
30	5	8	15	5	10	12	15	10	8	12	100
31	8	10	24	8	8	8	8	8	8	10	100
32	25	5	5	10	5	10	20	5	5	10	100
33	12	5	2	3	3	15	20	18	15	7	100
34	10	10	15	5	20	5	5	5	5	20	100
35	10	10	25	0	15	10	20	0	0	10	100
36	10	5	15	0	20	10	15	5	0	20	100
37	0	10	10	0	10	10	20	20	0	20	100
38	11	11	6	6	11	11	11	11	11	11	100
39	15	13	10	10	14	7	7	7	7	10	100
40	12	6	12	4	12	12	12	12	6	12	100
41	10	10	5	5	5	15	20	15	5	10	100
MEAN	9.13	8.79	11.63	5.45	12.68	9.35	12.24	9.38	7.24	14.09	100.00
MINIMUM	0.00	2.00	0.00	0.00	3.00	2.00	2.00	0.00	0.00	4.00	100.00
MAXIMUM	40.00	20.00	30.00	20.00	25.00	15.00	30.00	20.00	15.00	25.00	100.00
STD. DEVIATION	7.36	4.54	6.75	3.66	5.19	3.21	5.76	4.57	3.96	5.00	0.00

Source: ERT, 1987

CHAPTER 3

SITE INVENTORY DATA BASE

OBJECTIVES

The effectiveness and ultimate acceptability of a site assessment analysis is largely determined by the comprehensiveness and validity of the data base utilized. For the Site Screening Analysis to be defensible, the most comprehensive, recent, consistent, and accurate information had to be used. The Site Screening Analysis drew upon the most current secondary (published) information that was consistently available for the geographic study area. Assistance from the appropriate local, regional, and State agencies was sought to ensure the analysis was based upon the most current data available.

To ensure the accuracy of the secondary data sources, a comprehensive reconnaissance-level field verification program was undertaken. Field teams visited all ~300 of the sites in the Site Universe to verify and augment the data base. The field surveys of each site and adjacent communities emphasized site area characterization and identification of notable features, including the condition of the adjacent roadways and transportation network and the loctions of particularly sensitive receptors. Since the MWRA does not have access rights to the potential sites, the field surveys concentrated on the site perimeter and nearby surroundings.

DATA SOURCES

To consistently capture data on each location in the Site Universe, a Data Inventory Form was developed. The data collection form, provided in Appendix C, was organized around the following data sources:

- U.S. Geological Survey Topographic Quadrangles (7.5 minute series)

- U.S. Fish and Wildlife Service National Wetlands Inventory Maps
- Federal Emergency Management Agency Flood Insurance Rate Maps
- Metropolitan Area Planning Council 1980 Land Use Maps
- Local Zoning Maps
- Massachusetts Department of Environmental Quality Engineering Aquifer Maps
- Massachusetts Department of Environmental Quality Engineering Waste Source Maps
- Massachusetts Department of Environmental Quality Engineering Ambient Air Quality Standards Attainment Status listings
- U.S. Soil Conservation Service Soil Surveys
- Massachusetts Natural Heritage Program information on threatened or endangered species
- Massachusetts Historical Commission data on historical and archeological resources
- Reconnaissance field survey results

A comprehensive list of all data resources utilized in the Site Screening Analysis appears in the Bibliography. A summary of the site information obtained from each of the above data sources follows.

U.S. Geological Survey Topographical Quadrangles

USGS Topographical Quadrangles were the base means of identifying the site locations and boundaries. Site boundaries were drawn on acetate overlays of the USGS Quadrangles and remaining secondary data sources and the site inventory were organized accordingly.

Physical data recorded from the Topographical Quadrangles included:

- Site location (UTM coordinates)
- Site dimensions
- Minimum and maximum elevations
- Dominate topography (slope gradient and direction)
- Descriptions of utility lines
- Terrain description for surrounding area
- Dispersion environment features
- Access roadways and travel distances
- Location of rail facilities
- Location of adjacent waterways
- Location of nearby sensitive receptors
- Drainage basin identification
- Identification of surface water bodies

U.S. Fish and Wildlife Service National Wetlands Inventory

U.S. Fish and Wildlife Service National Wetlands Inventory maps provided the following wetlands data:

- Type and acreage of on-site wetlands
- Type, acreage and proximity of off-site wetlands

Federal Emergency Management Agency Flood Insurance Rate Maps

FEMA Flood Insurance Rate Maps provided the following flood information for each site:

- On-site percent coverage of 100 year flood zones
- Proximity to off-site 100 year flood zones

Metropolitan Area Planning Commission Land Use Maps

MAPC Land use maps provided the following land use data.

- On-site and off-site (1 km) acreages of the following land use types:
  - Industrial (UI, UW, M)
  - Commercial (UC)
  - Residential (R1, R2, R3)
  - Open space/recreation (UO, O, RW, RP, RS)
  - Forest (F)
  - Agricultural (AC, AP)
- Information on the presence of natural buffers with respect to abutting land uses.

Local Zoning Maps

Town or city zoning maps for all communities in the MWRA service area provided on-site and off-site acreages of the following land use zoning types:

- Industrial
- Commercial
- Residential
- Other

Massachusetts Department of Environmental Quality Engineering Groundwater Maps

DEQE groundwater maps provided the following data:

- Yield (H, M, L) and value (gpm) of on-site aquifers
- Type, use, yield (gpm) and depth to water table data for on-site wells
- Yield (H, M, L), and value (gpm) of off-site (2 km) aquifers

- Type, use, yield (gpm), depth to water table, and proximity to off-site wells
- Name, type, use, and proximity of surface public water supplies

Massachusetts Department of Environmental Quality Engineering Waste Source Maps

DEQE waste source maps provided the following information on surface impoundments, landfills, confined hazardous waste sites, injection wells, and salt storage areas:

- Identification of known on-site waste sources
- Identification and proximity of off-site (2 km) waste sources

U.S. Soil Conservations Service (SCS) Soil Surveys

SCS soil surveys provided information on the type, coverage and drainage classification of on-site soils. For some of the service area, SCS soil surveys had not been completed. Field survey data not yet published were provided by the District Conservationist.

Massachusetts Natural Heritage Program

The Massachusetts Natural Heritage Program provided information regarding on-site and off-site presence of threatened or endangered (T&E) flora and fauna species. Presence of breeding areas, resident T&E species, migratory pathways or critical habitat concerns were also identified along with proximity to ecologically sensitive areas. Because of the sensitivity of the locations of certain T&E species and to ensure their protection, the names of individual species were not recorded.

Massachusetts Historical Society

The Historical Society provided historical register and archeological information both on- and off-site. Nominated historical register sites were also included per the advice of the Historical Society technical representative. The archeological data were recorded from a USGS topo map series developed by the Historical Society. Nominated historical register sites are organized on town maps by the Historical Society. Because of the sensitivity of the locations of certain historical resources, no identification of the type of historical or archeological concern was completed at this level of site screening.

Local Assessor Offices

The following information was obtained from each assessors, engineering, and/or planning office in each of the 43 MWRA communities.

- Identification of all parcels (acreage and owner) within each site
- Status of any current development plans regarding the site
- Ownership and acreage of abutting parcels
- Status of any development proposals for abutting parcels
- Any available information regarding deeded conservation restrictions or easements
- Identification of potential sites that had not previously been included in the site universe.

Field Survey Documentation

Results of the reconnaissance level field surveys were recorded on a field survey form. The field surveys are discussed in detail in the following section.

FIELD VERIFICATION PROCESS

To ensure the accuracy of the site data, reconnaissance-level field verification surveys were undertaken for each location in the Site Universe. The data collection forms, completed from secondary data sources, were reviewed on-site for errors, omissions or recent changes. The field surveys focused on the perimeter of each site, surrounding adjacent communities within a 1 km radius, and transportation access corridors from the nearest major arterial highway to the immediate site area. The field surveys emphasized site area characterization and identification of notable features, particularly sensitive receptors.

Since the most current MAPC land use information was as of 1980, considerable attention was placed on updating both on-site and off-site land use data. Because MWRA did not have site access rights, on-site land use information was gathered from the site perimeter and from available overlooks. Characterization of off-site land use focused on abutting properties with particular attention placed on the presence of natural or man-made buffers.

The lists of sensitive receptors, recorded from USGS topographical quadrangles were field verified. A number of receptors that had been recorded were no longer relevant (e.g., closed schools). The lists were also augmented with the identification of sensitive receptors which would not have been identified on the topographic maps, such as convalescent homes, as well as newly constructed schools or hospitals.

Notations were made of other site features including a description of the general noise environment, the location and types of nearby major noise sources, the general condition of access roadways, traffic characteristics and other notable site features. Slides were taken during the site visits depicting general site characteristics, adjacent land uses, and access routes.

DATA BASE MANAGEMENT

To ensure accurate and efficient recording, storage, and handling of the multitude of information collected during the Site Screening Analysis, careful attention had to be given to data base management. Both manual and computerized techniques were used to efficiently handle data.

Site identification numbers were assigned to each location in the Site Universe and a file folder was created for each. The completed data collection forms, assessors office visit notes, field verification notes, and slides taken during the field surveys are contained in each site folder. Also included in each site folder are any data on the site from previous studies and newspaper clippings regarding development or real estate transactions involving the site.

The information collected was also organized through the use of a computerized data base management system (DBMS). A standard DBMS package, dBASE III,* was utilized to computerize the information from the data collection forms, maintain a master log of slides taken during the field surveys, and maintain the Site Screening Assessment Bibliography. Use of this DBMS enabled ready access and efficient handling of this rather large volume of data. It also enabled graphic presentations of the ranges and distributions of pertinent data on the universe of sites.

Tabulations of the attitudinal survey results used to develop the weighting factors, the tabulations of the actual site suitability scores, and hierarchical ordering of the site universe were determined to be better suited to a spreadsheet

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*dBASE III is a registered trademark of Ashton-Tate

package. The Symphony** software package was selected for this purpose. Use of standardized software packages such as Symphony and dBASE III on personal computers (PC's) has the added advantage of efficient transfer of information to MWRA personal computer systems.

**Symphony is a registered trademark of the Lotus Development Corporation.

CHAPTER 4
SITE SUITABILITY SCORING PROCEDURE

SITE SUITABILITY SCORES

A team of ERT professionals experienced in the various fields represented by the site suitability screening criteria (meteorologists, geologists, land use planners, ecologists, etc.) was assembled. The panel assigned separate suitability scores to each site for each of the ten screening criteria based on the site suitability scales (provided in Appendix A) and the site data, field notes and slides (described in Chapter 3). The scores depended upon the suitability scales contained in Appendix A and the professional judgement of the panel as to how each site matched up against those criteria.

Once each site had been assigned a separate suitability score (ranging from 0 to 10) for each screening criterion, an overall (weighted) suitability score was computed for each site by weighting each individual criterion's suitability score with the appropriate weighting factor (See Table 2-3) and summing the weighted scores. The result was a maximum potential score of 100 points for each site. The weighting factors reflect the relative importance of each criterion in defining overall site suitability, as discussed previously in Chapter 2.

SITE ORDERING

The sites were initially ordered from the most potentially suitable (highest score) to the least potentially suitable (lowest score) based on the overall (weighted) suitability scores. Since during the field verification process considerable new development was noted, an adjustment to the initial ordering was required. Many sites, now developed, would not have met the initial Site Identification Criteria had the development been known when the site was entered into the

Site Universe. As a result, the initial listing of sites was reevaluated according to on-site land use and revised acreage availability data.

This evaluation was completed using the following coded criterion:

On-Site Land Use Codes

A-1:	State Park;
A-2:	Town Park or designated Conservation Land;
B-1:	Existing, developed site use (ongoing) and/or new development under construction;
B-2	Low intensity existing site use (i.e. quarry, park-ride, warehouses, drive-in theaters);
B-3:	Abandoned, existing land use (i.e. abandoned warehouses);
C-1:	Vacant land.

If an adequate number of undeveloped or abandoned acres (i.e. > 8 inland, > 5 coastal) on an otherwise developed site existed, the site was coded according to the undeveloped or abandoned portion of the site.

Once the on-site land use codes were established, the sites were sorted by a separate land use ranking. The site universe was separated into two groups. The first group consisted of sites with land use codes of A-1, A-2, B-2, B-3, and C-1. The second group consisted of sites coded B-1. The B-1 site group was placed below the first group in the site ordering. Within each group, sites were ordered by their previously assigned weighted score value.

The results of the site suitability scoring are detailed in Volume II. All of the Tier 1 sites were carried forward into Tier 2, the technology-specific reordering phase of the RMFP, as discussed in Chapter 5.

CHAPTER 5

TECHNOLOGY-SPECIFIC SITE SUITABILITY

INTRODUCTION

The Candidate Options Identification phase of the RMFP (Tier 2) brings together the results of the residuals characterization, technology assessment, transportation assessment, and site screening analysis to develop a reasonable number of complete residuals management alternatives to be analyzed in the Candidate Options Evaluation (Tier 3). This comparative evaluation will be used to identify, if possible, a preferred candidate option and one or two alternates for more detailed analysis in the Final Options Analysis Phase (Tier 4) of the RMFP.

The approach used to identify candidate options is based on development of alternatives that "make sense" from a "systems" point of view, rather than identifying several "good" sites and letting the site characteristics drive the development of alternatives (e.g., what residuals management program could be developed around a specific site). These systems define the types of materials handling and processing that would have to be accommodated at the point of collection of the sludge, at a coastal site, and at one or more inland sites. These handling and processing activities establish the specific siting needs, such as site size, buffer area, and transportation requirements. The universe of sites from the Tier 1 Site Screening Analysis were re-ordered to identify the best available site or sites to fulfill the various system requirements.

The definition of system alternatives involves considerations of technology, transportation, and residuals characteristics. The candidate options systems under consideration entail various combinations of the following residuals management facility plan components, or site types:

- Coastal Transfer Sites

- Coastal Combustion Only Sites
- Inland Combustion Only Sites
- Coastal Composting Only Sites
- Inland Composting Only Sites
- Coastal Combustion and Composting Sites
- Inland Combustion and Composting Sites
- Inland Landfill Sites

The purpose of this chapter is to describe the process that was used to develop, from the generic Tier 1 site ordering, a separate ordered list of site candidates for each of the above residuals management facility components. From these ordered lists, sites were selected for combination with System Alternatives to produce the initial listing of candidate options.

OBJECTIVES

The objectives of the Tier 2 technology-specific site reordering process were:

- to ensure consistency with the Tier 1 site screening criteria and process;
- to refine the Tier 1 screening process to reflect technology-specific requirements rather than re-defining criteria;
- to build upon the Tier 1 efforts, making maximum use of the site-specific data that were gathered and field verified (see Chapter 3), and the site evaluations that were previously conducted (see Chapter 4).
- to utilize the results of the attitudinal survey which reflect the opinions of the Citizens Advisory Committee (CAC), technical advisors, and MWRA staff on the relative importance of various site suitability criteria; and

- to reflect the siting requirements of the major technologies as determined in the technology and transportation assessment reports.

METHODOLOGY OVERVIEW

A flow chart illustrating the Tier 2, Candidate Options Identification site reordering process is presented in Figure 5-1. A summary of the major steps follows.

1. For each of the unverse of sites identified in Tier 1, net useable area was calculated by identifying undevelopable portions of each site (e.g., developed area, surface water bodies, significant wetland areas, or severe slopes).
2. From the Technology Assessment, minimum site area requirements were determined for the potential RMFP component uses listed earlier (e.g., coastal transfer site, inland composting site, etc.).
3. Useable area was compared with minimum site area requirements for the above RMFP component uses.
4. Lists of sites were developed which satisfy the minimum acreage requirements for each of the RMFP components.
5. Technology-specific suitability criteria were developed for each possible RMFP component. These technology-specific weighting factors amplify the importance of certain Tier 1 suitability criteria and deemphasize others.
6. Technology-specific weighting factors were applied to the suitability scores and weighting factors (technology-independent) developed in Tier 1 to derive, for each site, a separate technology-specific suitability score for each RMFP component use.
7. Separate ordered lists were developed for each of the RMFP component uses identified above.

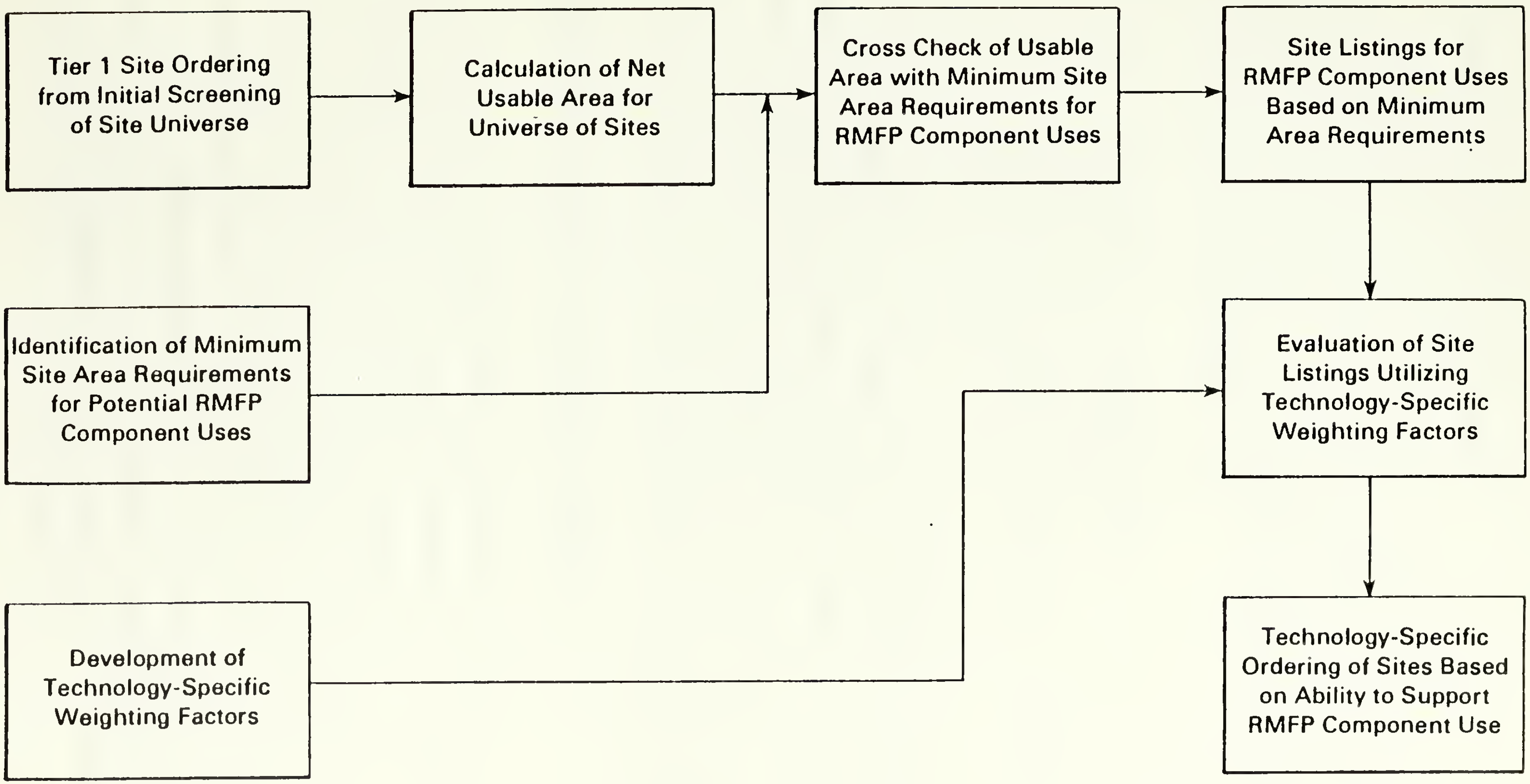


Figure 5-1 Technology Specific Site Ordering Process Diagram

The remainder of this chapter discusses in more detail the major elements of the above methodology.

Minimum Site Area Requirements

The first step in the site reordering process entailed calculation of the net useable area for each site. Using the site data gathered in Tier 1, portions of each site that present the following major development obstacles were netted out of total site acreage:

- Currently developed area
- Surface water bodies
- Bordering vegetative wetlands (>5,000 sq. ft.)
- Severe slopes (>15%)

Remaining net area for each site was compared against the minimum acreage requirements identified for each of the RMFP component uses in Chapter 1 of the report: Candidate Options Identification (Black & Veatch 1987).

A separate list of sites was generated for each of the RMFP component uses identified earlier, consisting of all of the sites which met the appropriate acreage requirements.

TECHNOLOGY-SPECIFIC WEIGHTING FACTORS

In Tier 1, sites were assigned suitability scores for each of the ten screening criteria presented in Chapter 2, independent of any particular technology. The technology-specific site reordering was accomplished by applying a set of technology-specific weighting factors that reflect the relative importance of each of the ten individual screening criteria in terms of overall suitability for a particular RMFP component use. The technology-specific weighting factors serve to amplify the importance of certain criteria and deemphasize the importance of others based on technology-specific site requirements.

The technology-specific weighting factors range from 1, low importance, to 5, high importance. These weighting factors, presented in Table 5-1, were developed in a workshop forum by a panel of technical team members representing the various disciplines reflected in the screening criteria (meteorologists, land use planners, water resource engineers, ecologists, geologists, etc). The technology-specific weighting factors reflect the relative importance of the ten screening criteria for each technology. Since sites are scored separately for each technology, the factors do not necessarily represent the relative importance of a given criteria from one technology to another. The technology-specific weighting factors when applied to the suitability scores assigned each site in Tier 1, "adjust" the overall suitability ratings to reflect the differences in siting requirements associated with the various RMFP component uses. For example, a site's score for air quality is relatively more important that its score for ground water when the technology is combustion, but the reverse is true when the technology is landfilling.

The relative importance of each of the ten screening criteria in the overall, technology specific site suitability scoring is depicted in the following figures. Figure 5-2 shows the relative importance of each of the ten criteria for coastal transfer sites; Figure 5-3 shows the relative importance of the critieria for combustion only sites; Figure 5-4 shows the relative importance of the criteria for composting only; Figure 5-5 shows the relative importance of the criteria for dual technology combustion and composting sites; Figure 5-6 shows the relative importance for landfill sites; and, for reference, Figure 5-7 shows the relative importance of the criteria for the technology-independent scoring in Tier 1.

TECHNOLOGY-SPECIFIC SITE REORDERING

In Tier 1, each site was assigned a separate suitability score (ranging from 0, least suitable, to 10, most suitable)

TABLE 5-1

TECHNOLOGY-SPECIFIC SITE SUITABILITY COEFFICIENTS

Evaluation Criteria	Combustion Only	Composting Only	Combustion & Composting	Landfill	Coastal Transfer
Engineering Parameters	2	1	1	4	2
Noise	4	3	4	3	3
Land Use	5	5	5	5	5
Cultural Resources	1	1	1	2	1
Transportation/Traffic	5	5	5	4	5
Surface Water	3	3	3	5	2
Ground Water	2	2	2	5	1
Wetlands	3	3	3	5	3
Ecology	3	3	3	3	2
Air Quality/Odors	5	4	5	3	3

5 = very important

3 = moderately important

1 = not very important

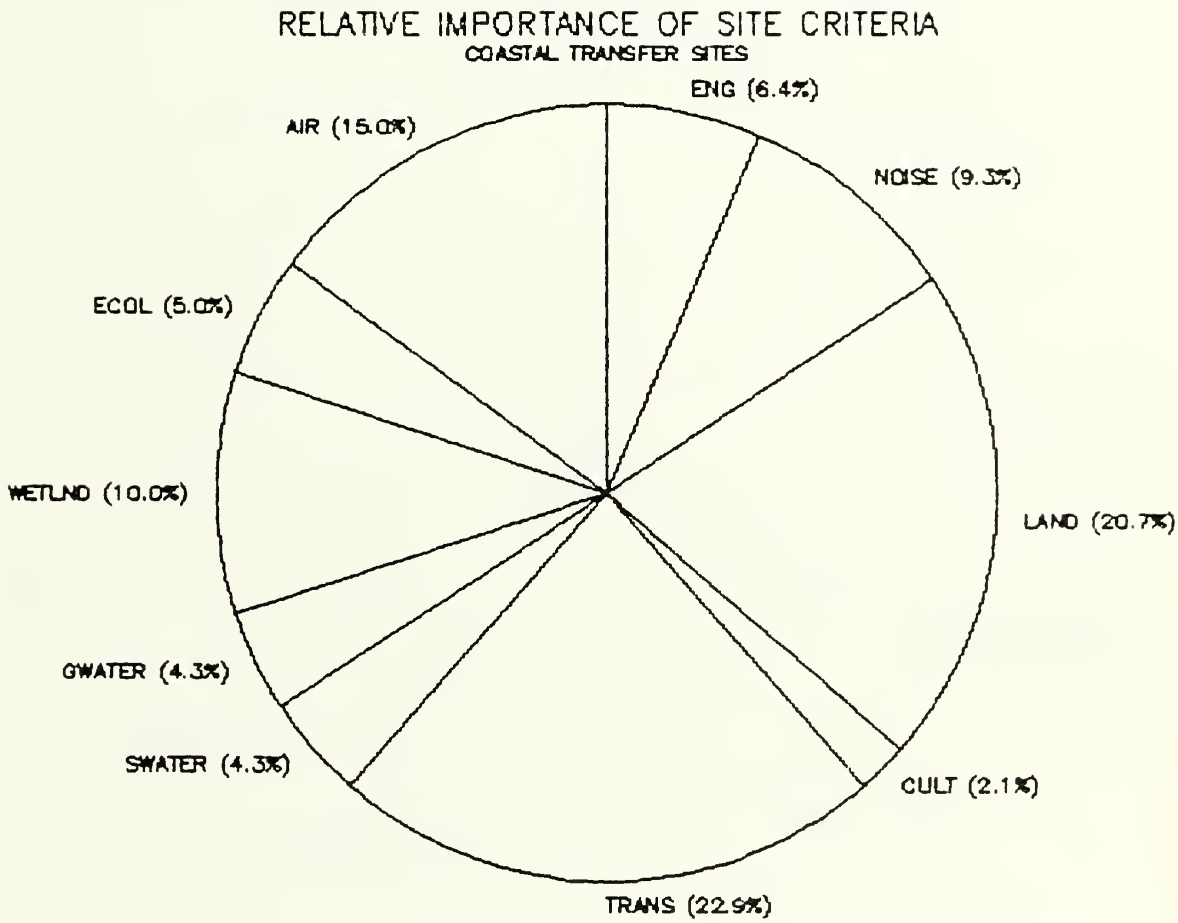
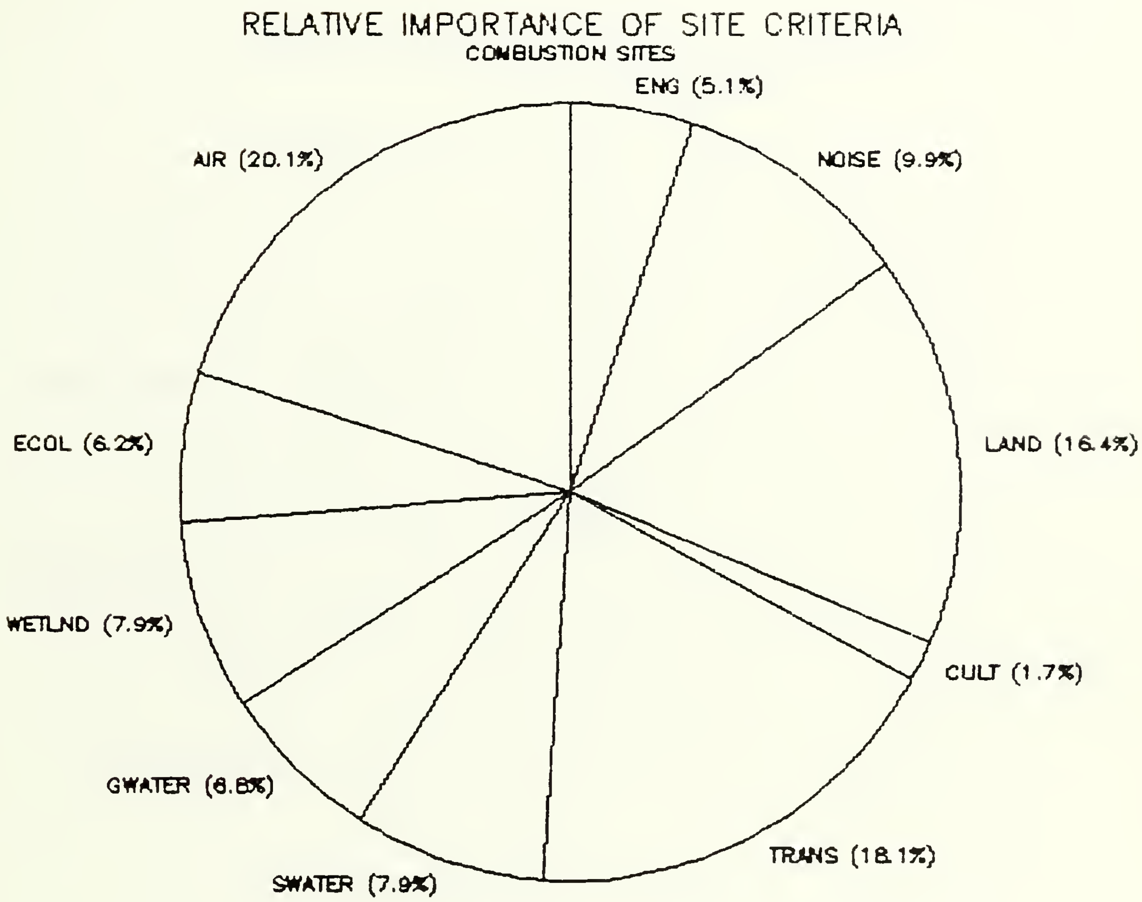

RELATIVE IMPORTANCE OF SITE CRITERIA
COASTAL TRANSFER SITES
ENG (6.4%)
NOISE (9.3%)
LAND (20.7%)
CULT (2.1%)
TRANS (22.9%)
SWATER (4.3%)
GWATER (4.3%)
WETLND (10.0%)
ECOL (5.0%)
AIR (15.0%)

Figure 5-2



RELATIVE IMPORTANCE OF SITE CRITERIA
COMBUSTION SITES
ENG (5.1%)
NOISE (9.9%)
LAND (16.4%)
CULT (1.7%)
TRANS (18.1%)
SWATER (7.9%)
GWATER (6.8%)
WETLND (7.9%)
ECOL (6.2%)
AIR (20.1%)

Figure 5-3

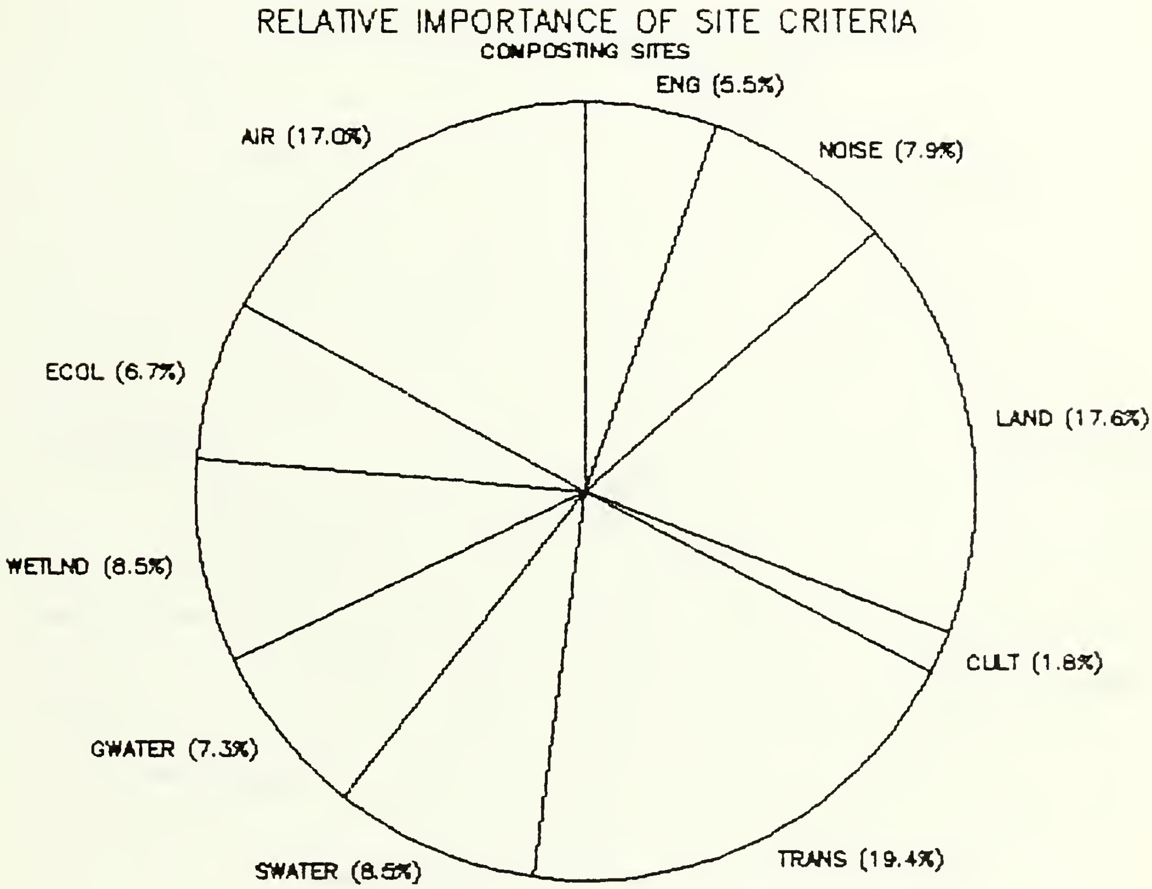

RELATIVE IMPORTANCE OF SITE CRITERIA
COMPOSTING SITES
ENG (5.5%)
NOISE (7.9%)
AIR (17.0%)
ECOL (6.7%)
LAND (17.6%)
WETLND (8.5%)
CULT (1.8%)
GWATER (7.3%)
SWATER (8.5%)
TRANS (19.4%)

Figure 5-4

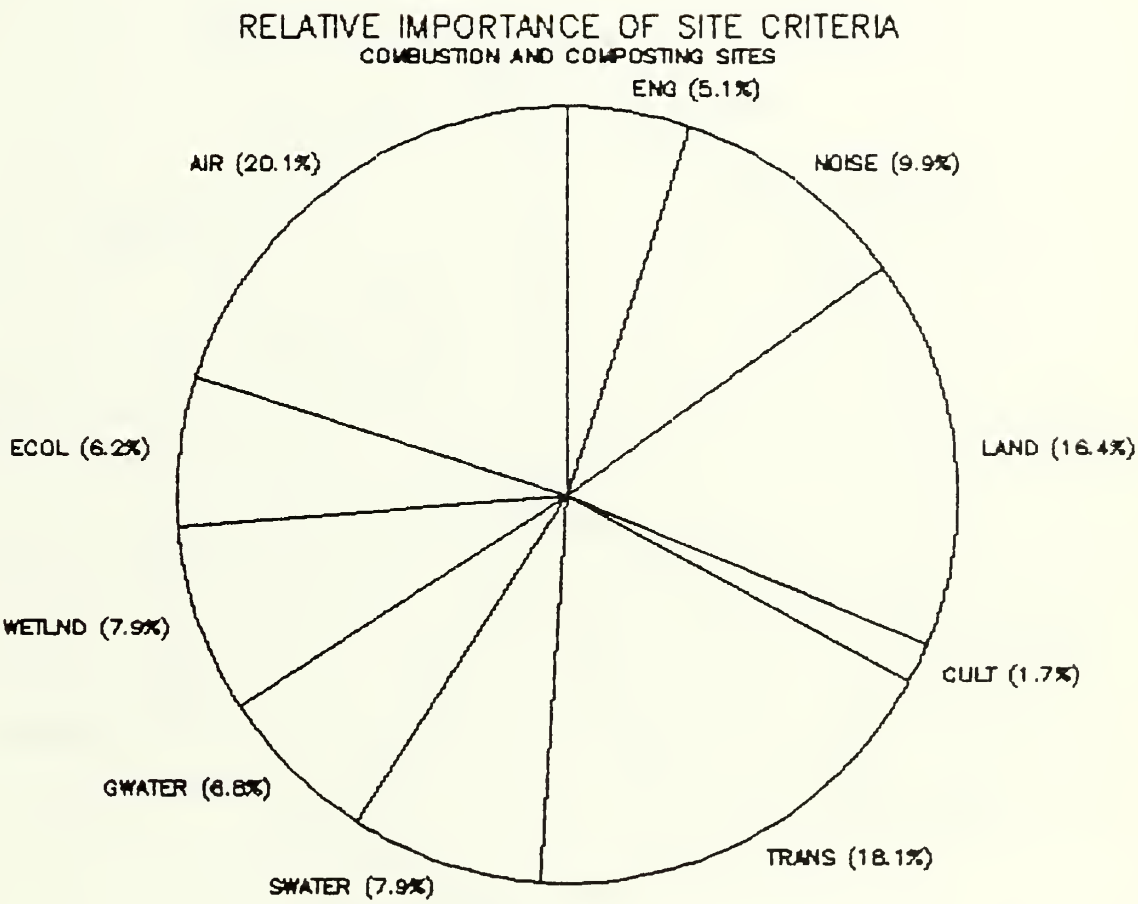

RELATIVE IMPORTANCE OF SITE CRITERIA
COMBUSTION AND COMPOSTING SITES
ENG (5.1%)
NOISE (9.9%)
AIR (20.1%)
LAND (16.4%)
ECOL (6.2%)
WETLND (7.9%)
CULT (1.7%)
GWATER (6.8%)
TRANS (18.1%)
SWATER (7.9%)

Figure 5-5

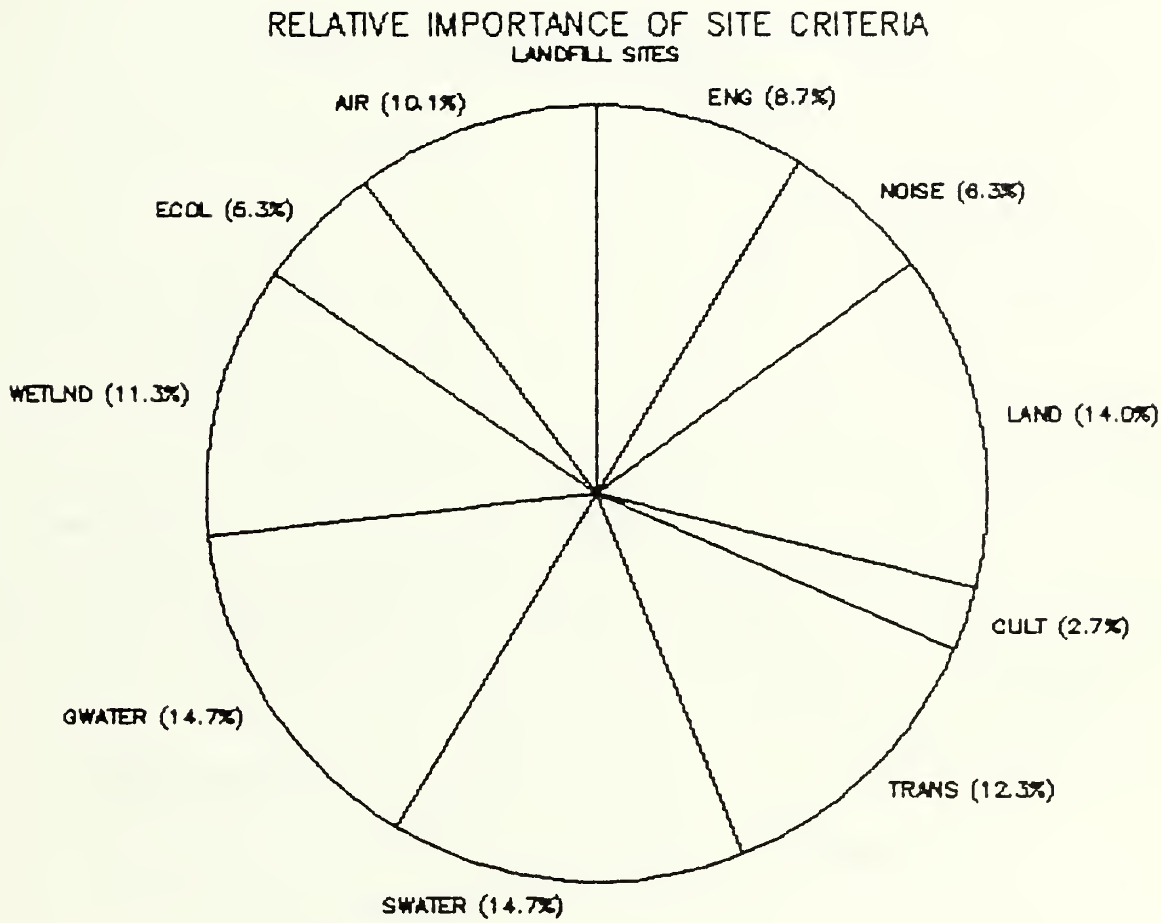

RELATIVE IMPORTANCE OF SITE CRITERIA
LANDFILL SITES
AIR (10.1%)
ENG (8.7%)
NOISE (6.3%)
ECOL (5.3%)
WETLND (11.3%)
LAND (14.0%)
CULT (2.7%)
GWATER (14.7%)
TRANS (12.3%)
SWATER (14.7%)

Figure 5-6

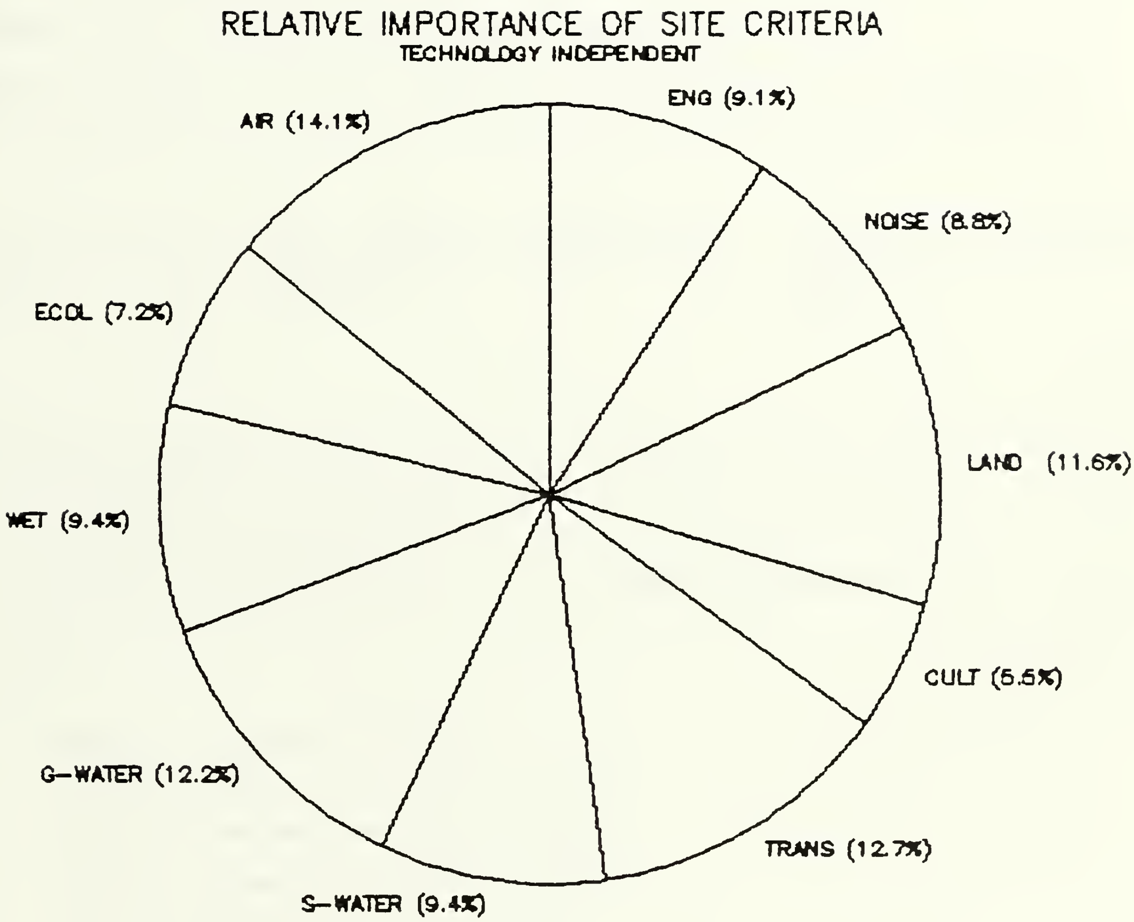

RELATIVE IMPORTANCE OF SITE CRITERIA
TECHNOLOGY INDEPENDENT
ENG (9.1%)
NOISE (8.8%)
LAND (11.6%)
CULT (5.5%)
TRANS (12.7%)
S-WATER (9.4%)
G-WATER (12.2%)
WET (9.4%)
ECOL (7.2%)
AIR (14.1%)

Figure 5-7

for each of the ten screening criteria. For each RMFP component use, a technology-specific suitability score was derived for each site by multiplying each of the ten initial screening criterion's Tier 1 suitability score with the appropriate technology-specific weighting factor from Table 5-1 and summing the weighted scores. Since the Tier 1 suitability scores were already weighted (independent of any particular technology) using weighting factors developed by the attitudinal survey, the net result is the sum of the following product for each of the ten site suitability screening criteria:

$$\begin{pmatrix}\text{The raw (unweigh-}\\ \text{ted) score}\\ \text{assigned in}\\ \text{tier 1}\end{pmatrix} \times \begin{pmatrix}\text{The tier 1 technology}\\ \text{independent weighting}\\ \text{factor}\end{pmatrix} \times \begin{pmatrix}\text{The tier 2 technology}\\ \text{specific weighting}\\ \text{factor}\end{pmatrix}$$

For each RMFP component use, sites are ordered from most potentially suitable to least potentially suitable based on the technology-specific suitability scores. The results are separate ordered lists for each of the RMFP component uses identified earlier:

- Coastal Transfer Sites
- Coastal Combustion Only Sites
- Inland Combustion Only Sites
- Coastal Composting Only Sites
- Inland Composting Only Sites
- Coastal Combustion and Composting Sites
- Inland Combustion and Composting Sites
- Inland Landfill Sites

It is from these ordered lists that sites were selected for combination with System Alternatives to produce the initial listing of candidate options. The Tier 1 and 2 site ordered lists are presented in Volume II. The matching process and resulting Candidate Options are discussed in the Candidate Options Identification Report.

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CE MAQUIRE, INC	1986	NOMINATION OF CANDIDATE SITES: PRELIMINARY SITE INVENTORY DOCUMENT	MWRA	ERT
CHEREMISINOFF, PN	1986	SPECIAL REPORT: HAZARDOUS MATERIALS AND SLUDGE INCINERATION P. 32-38	POLLUTION ENGINEERING	ERT
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT	1984	BOSTON HARBOR ISLANDS STATE PARK 1984 MASTER PLAN	MA DEPARTMENT OF ENVIRONMENTAL MANAGE.	MWRA
DEWLING, L. R. MANGANELLI AND G. BAER	1980	JOURNAL OF W.P.C.F. VOL 52 #10 P 2552-2557	JOURNAL OF W.P.C.F.	ERT
DEWLING, RT	1980	SEWAGE-SLUDGE INCINERATION RAISES AIR POLLUTION CONCERNS (P26-29)	WATER AND SEWAGE WORKS	ERT
DEWLING, RT AND ALBRINCK, DN	1980	ATMOSPHERIC EMISSIONS OF METALS FROM SEWAGE SLUDGE INCINERATORS (P 1119-1123)	JOUR AIR POLL CONT 32(11)	ERT
DIVISION OF WATER POLLUTION CONTROL	1984	BOSTON, MASSACHUSETTS DRAINAGE BASIN IDENTIFICATION	MASS SURFACE WATER QUALITY STANDARDS	ERT
DIVISION OF WATER POLLUTION CONTROL	1985	MASSACHUSETTS SURFACE WATER QUALITY STANDARDS	THE BUREAU OF NATIONAL AFFAIRS, INC	ERT
EC JORDAN CO.	1982	FATE OF PRIORITY POLLUTANTS IN PUBLICLY OWNED TREATMENT WORKS 30 DAY STUDY	USEPA EFFLUENT GUIDLIN DIV #440/1-82/302	ERT
ECOLSCIENCES, INC / EPA	1979	FINAL ENVIRONMENTAL IMPACT STATEMENT MDC PROPOSED SLUDGE MANAGEMENT PLAN, METROPOLITAN DISTRICT COMMISSION, BOSTON MA PART B VOL I	EPA	MWRA
ECOLSCIENCES, INC /EPA	1979	FINAL ENVIRONMENTAL IMPACT STATEMENT MCD PROPOSED SLUDGE MANAGEMENT PLAN, METROPOLITAN DISTRICT COMMISSION BOSTON MA PART B VOL.II	EPA	MWRA
ECOLSCIENCES, INC.	1979	FINAL ENVIRONMENTAL IMPACT STATEMENT MDC PROPOSED SLUDGE MANAGEMENT PLAN, METROPOLITAN DISTRICT COMMISSION, BOSTON, MA PART A	ECOLSCIENCÉS, INC	MWRA
EG & G	1984	OCEANOGRAPHIC STUDY OF VARIOUS OUTFALL SITING OPTIONS FOR THE DEER ISLAND TREATMENT PLANT.	HAVENS AND EMERSON	MWRA
EG & G WASHINGTON ANALYTICAL SERVICES CENTER INC	1984	OCEANOGRAPHIC STUDY OF VARIOUS OUTFALL SITING OPTIONS FOR THE DEER ISLAND TREATMENT PLANT	HAVENS & EMERSON	MWRA
ENVIRONMENTAL REPORTER	1985	FEDERAL REGULATIONS EMMISSIONS CONTROL REGIONS	BUREAU OF NATIONAL AFFAIRS, INC.	ERT
EPA FEDERAL REISTER	1986	40 CFR PART 60 (P 13424-433)	EPA (VOL 51 NO 75)	ERT
FENNELLY, PF AND WHITE, MO/ GCA-TECHNOLOGY DIV	1981	THE FATE OF TRACE METALS IN A FLUIDIZED BED SEWAGE SLUDGE INCINERATOR	US EPA NY NY	ERT
FRASER, JL AND LUM, KR	1983	AVAILABILITY OF ELEMENTS OF ENVIRONMENTAL IMPORTANCE IN INCINERATED SLUDGE ASH (P 52-54)	ENVIRON SCIENCE AND TECHNOLOGY VOL 17	ERT
FROUNFELDER, R	1986	HEAT RECOVERY INCINERATION FOR THE CITY AND BOROUGH OF SITKA, ALASKA (P.283-297)	'86 NATIONAL WASTE PROCESSING CONFERENCE	ERT
GEO/PLAN	1986	COASTAL SITING UPDATE: RESIDUALS MANAGEMENT FACILITIES PLAN	SEA	MWRA
GEO/PLAN ASS.	1985	TRANSPORTATION ALTERNATIVES RESIDUALS MANAGEMENT FACILITIES PLAN	GEO/PLAN	MWRA
GEO/PLAN ASS.	1985	RESIDUALS MANAGEMENT FACILITIES PLAN: CURRENT AND FUTURE SITUATION PRELIMINARY REPORT	GEO/PLAN	MWRA
GERSTLE, R.W. AND ALBRINCK D.N.	1982	ATMOSPHERIC EMISSIONS OF METALS FROM SEWAGE SLUDGE INCINERATORS P (1119-1123)	JOURNAL OF AIR POLL CONTROL 32(11)	ERT
GREELEY AND HANSEN AND ENVIR.ASSESS. COUNCIL, INC	1978	DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE UPGRADING OF THE BOSTON METROPOLITAN AREA SEWAGE SYSTEM VOLUME II	MWRA	MWRA
GREENBERG, RR ZOLLER, WH AND GORDON, GE	1981	ATMOSPHERIC EMISSIONS OF ELEMENTS ON PARTICLES FROM THE PARKWAY SEWAGE-SLUDGE INCINERATOR (P 64-70)	ENVIRON SCI TECHNOL 15 (1)	ERT
HALL, RR ET AL / GCA-TECHNOLOGY DIV	1983	TECHNICALREVIEW AND REGULATORY ANALYSIS OF SEWAGE SLUDGE INCINERATION FINAL REPORT VOLUME II	STATE OF NEW JERSEY	ERT
HAUG, RT ET AL	1984	FLUIDIZED BED GASIFICATION OF SLUDGE DERIVED FUEL (P 697-719)	'84 NATIONAL WASTE PROCESSING CONFERENCE	ERT
HAVENS AND EMERSON	1982	WASTEWATER SLUDGE MAN.UPDATE-SUMMARY REPORT APPENDIX F:ARCHAEOLOGICAL SURVEY OF THE PROPOSED MDC SLUDGE MAN.PLANT, DEER IS MA	MDC	MWRA
HAVENS AND EMERSON	1982	WASTEWATER SLUDGE MANAGEMENT UPDATE - SUMMARY REPORT APPENDIX A: STATUS OF WASTEWATER SOLIDS DEWATERING TECHNOLOGY	MDC	MWRA
HAVENS AND EMERSON	1982	WASTEWATER SLUDGE MANAGEMENT UPDATE - SUMMARY REPORT	MDC	MWRA
HAVENS AND EMERSON	1982	WASTEWATER SLUDGE MANAGEMENT UPDATE-SUMMARY REPORT APPENDIX E: COMPLIANCE OF SEWAGE SLUDGE DISPOSAL WITH OCEAN DISCHARGE CRITERIA	MDC	MWRA
HAVENS AND EMERSON	1973	A PLAN FOR SLUDGE MANAGEMENT	MDC	MWRA
HAVENS AND EMERSON	1982	WASTEWATER SLUDGE MANAGEMENT UPDATE-SUMMARY REPORT APPENDIX D: WASTEWATER SLUDGE INCINERATION ISSUES & RECOMMENDATIONS PRELIMINARY	MDC	MWRA
HAVENS AND EMERSON	1974	ENVIRONMENTAL ASSESSMENT STATEMENT FOR A PLAN FOR SLUDGE MANAGEMENT	BDC	MWRA

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HAVENS AND EMERSON	1973	A PLAN FOR SLUDGE MANAGEMENT	MDC	MWRA
HAVENS AND EMERSON	1982	WASTEWATER SLUDGE MANAGEMENT UPDATE - SUMMARY REPORT APPENDIX B: AIR QUALITY SUMMARY	MDC	MWRA
HAVENS AND EMERSON	1982	WASTEWATER SLUDGE MANAGEMENT UPDATE - SUMMARY REPORT APPENDIX C: REVIEW OF MUNICIPAL WASTEWATER SLUDGE COMPOSTING	MCO	MWRA
HAVENS AND EMERSON, LTD	1974	ENVIRONMENTAL ASSESSMENT STATEMENT FRO A PLAN FOR SLUDGE MANAGEMENT	MDC	MWRA
HAVENS AND EMERSON/PARSONS BRINCKERHOFF	1986	MWRA SEWERAGE DIVISION SCUM DISPOSAL FEASIBILITY STUDY: TECHNICAL SUPPORT DOCUMENT (DRAFT)	HAVENS AND EMERSON/PARSONS BRINCKERHOFF	ERT
HILL,M AND RUTKEY,F	1984	DEVELOPMENT OF AN INDUSTRIAL WASTE INCINERATION SYSTEM: PILOT TESTING THROUGH FULL-SCALE OPERATION (P 471-477)	'84 NATIONAL WASTE PROCESSING CONFERENCE	ERT
HOWARD FEILER, BURNS AND ROE INDUS. SERV. CORP	1979	FATE OF PRIORITY POLLUTANTS IN PUBLICLY OWNED TREATMENT WORKS POLOT STUDY	USEPA EFFLUENT GUIDLNS DIV #440/1-79-300	ERT
HUNT,GT ET AL / ERT	1986	NON-CRITERIA EMISSIONS MONI PRO FROM THE ENVIROTECH NINE-HEARTH SEWAGE SLUDGE INCINERATOR AT THE METRO WASTEH20 TREATMENT FACILITY	METROPOLITAN WASTE CONTROL COMMISSION	ERT
INDIANAPOLIS CENTER FOR ADVANCED RESEARCH	1983	PLANT - SCALE DEMONSTRATION OF SLUDGE INCINERATOR FUEL REDUCTION	US EPA CONTRACT 600/2-83-083	ERT
INTERSTATE SANITATION COMMISSION, NY	1981	THERMAL CONVERSION OF MUNICIPAL WASTEWATER SLUDGE, PHASE II: STUDY OF HEAVY METAL EMISSIONS	US EPA CONTRACT 600/2-81-203	ERT
JOHN BROWN ASSOCIATES, INC.	1981	OPERATION INDUSTRIAL UPLIFT - FINAL REPORT	ECONOMIC DEVELOPMENT ADMINISTRATION	ERT
JRB ASSOC.	1985	AUDIT OF PRETREATMENT PROGRAM, MDC, BOSTON MA	USEPA REG.I BOS.CONTR# 08-01-7043 WA#P-4	MWRA
JRB ASSOCIATES	1981	SOLID WASTE DATA, A COMPILATION OF STATISTICS ON SOLID WASTE MANAGEMENT WITHIN THE UNITED STATES	US EPA CONTRACT 68-01-6000	ERT
LAW,IJ AND SANNEMAN,FH	1986	DULUTH CODISPOSAL FACILITY UPDATE (P 79-89)	'86 NAT WASTE PROCESSING CONFER.	ERT
MASS DEPARTMENT OF ENVIRONMENTAL MANAGEMENT	1984	BOSTON HARBOR ISLANDS STATE PARK 1984 MASTER PLAN	MWRA	MWRA
MCINNES, R.G. ET AL /GCA TECHNOLOGY	1985	SAMPLING AND ANALYSIS PROGRAM AT THE NEW BEDFORD MUNICIPAL SEWAGE SLUDGE INCINERATOR	USEPA RTP TR-84-103-G	ERT
METCALF AND EDDY	1983	APPLI FOR MOD OF 2ND TREAT REQUIR FOR DISCH IN2 MARINE H20 OF BOS HAR AND MA BAY OFR DEER (&) NUT IS WASTEH20 TREAT PLANT BY COMM.	MDC	MWRA
METCALF AND EDDY	1982	APPLICATION FOR MODIFICATION OF SECONDARY TREATMENT REQUIR FOR ITS DEER (&) NUT IS EFFLUENT DISCHARGES INTO MARINE H20 ADDINDUM 3	MDC	MWRA
METCALF AND EDDY	1984	PLAN OF STUDY FOR REVISED APP FOR MOD OF SEC TREATMENT REQUIR FOR THE DEER (&) NUT IS EFFLUENT DISCHARGE IN MARINE H20	MDC	MWRA
METCALF AND EDDY	1982	APPLICATION FOR MODIFICATION OF SECONDARY TREATMENT REQUIR FOR ITS DEER (&) NUT IS EFFLUENT DISCHARGES INTO MARINE H20 ADDENDUM 2	MDC	MWRA
METCALF AND EDDY	1982	APPLICATION FOR MODIFICATION OF SECONDARY TREATMENT REQUIR FOR ITS DEER (&) NUT IS EFFLUENT DISCHARGES INTO MARINE H20 ADDENDUM I	MDC	MWRA
METCALF AND EDDY, INC.	1983	APPLICATION FOR MODIFICATION OF SECONDARY TREATMENT REQUIR FOR ITS DEER (AND) NUT ISLAND EFFLUENT DISCHARGES INTO MARINE WATERS	MWRA	MWRA
METROPOLITAN AREA PLANNING COUNCIL	1982	REGIONAL DECLINE OR REVIVAL: AN INTERIM POPULATION FORECAST FOR THE BOSTON METRO AREA 1980-2010	METROPOLITAN AREA PLANNING COUNCIL	MWRA
METROPOLITAN AREA PLANNING COUNCIL	1983	EMPLOYMENT LOCATION IN GREATER BOSTON: 1970-2010	MAPC	MWRA
METROPOLITAN AREA PLANNING COUNCIL	1983	EMPLOYMENT LOCATION IN GREATER BOSTON 1970-2010	MAPC	MWRA
METROPOLITAN AREA PLANNING COUNCIL	1982	REGIONAL DECLINE OR REVIVAL: AN INTERIM POPULATION FORECAST FOR THE BOSTON METROPOLITAN AREA	MAPC	MWRA
METROPOLITAN DISTRICT COMM / SEA	1985	STEP I-STATE GRANT AND ADVANCE OF FEDERAL GRANT: APPLICATION (TO DEQE) THE COMM OF MA METRO DISTRICT COMM RMFP	MDC	MWRA
METROPOLITAN DISTRICT COMMISSION	1985	DEER ISLAND COMPOSTING DEMONSTRATION FACILITY SUMMARY OF OPERATIONS	MDC	MWRA
METROPOLITAN DISTRICT COMMISSION SEWAGE DIVISION	1985	INDUSTRIAL WASTE REPORT NO. 21 VOLUME II	MWRA	MWRA
METROPOLITAN DISTRICT COMMISSION SEWERAGE DIVISION	1985	INDUSTRIAL WASTE REPORT NO. 21 VOLUME I	MWRA	MWRA
MURPHY,T.J. ET AL	1985	POLYCHLORINATED BIPHENYL EMISSIONS TO THE ATMOSPHERE IN THE GREAT LAKES REGION. MUNICIPAL LANDFILLS AND INCINERATORS P. 942-946	ENVIRONMENTAL SCIENCE AND TECH VOL 19	ERT
MYTELKA,A.	1979	AIR POLLUTION ASPECTS OF INCINERATION AND PYROLYSIS OF SEWAGE SLUDGE	AIR POLLUTION CONTROL ASSOCIATION	ERT
OKAZAWA,K SOTA,K AND HENMI,M	1986	ENERGY SAVING IN SEWAGE SLUDGE INCINERATION WITH INDIRECT HEAT DRYER (P 177-193)	NATIONAL WASTE PROCESS CONF '86	ERT
PEDCO ENVIRONMENTAL, INC	1977	SURVEY OF TECHNIQUES FOR MONITORING SEWAGE SLUDGE CHARGED TO MUNICIPAL SLUDGE INCINERATORS	US EPA	ERT
PIISPANEN, W. ET AL (GCA/TECHNOLOGY DIVISION)	1977	PCB COMPOUNDS EMANATING FROM THE NEW BEDFORD MUNICIPAL WASTEWATER INCENERATOR	US EPA C. # 68-01-3154 TASK ORDER #24	ERT
POMPELIA,DM	1984	AIR QUALITY REGULATORY ISSUES ASSOCIATED WITH RESOURCE RECOVERY (P 320-329)	'84 NATIONAL WASTE PROCESSING CONFERENCE	ERT
RADIAN CORP	1986	FINAL DRAFT TEST REPORT-SITE 03 SEWAGE SLUDGE INCENERATOR SSI-B NATIONAL DIOXIN STUDY TIER 4:COMBUSTION SOURCES	US EPA CONTRACT # 68-03-3148	ERT
RESEARCH TRIANGLE INSTITUTE	1984	COLLECTION EFFICIENCY EVALUATION OF MERCURY - TRAPPING MEDIA FOR THE SASS TRAIN IMPINGER SYSTEM	US EPA CONTRACT 600/7-84-089	ERT
RIZZO ASSOCIATES ET AL	1985	REVISED DRAFT ENVIRONMENTAL INFORMATION REPORT - NATICK MALL EXPANSION	EOEA	MWRA
RIZZO ASSOCIATES, INC ET AL	1985	NATICK MALL EXPANSION REVISED DRAFT ENVIRONMENTAL IMPACT REPORT	EOEA NO. 5418	MWRA
SEA CONSULTANTS, INC	1986	RMFP PHASE I OUTPUTS, CORRESPONDENCE, MEETING NOTES, ENF - BOOK I	MWRA	MWRA
SEA CONSULTANTS, INC	1985	INTERIM REPORT NO 2-INITIAL SCREENING OF ALTERNATIVES	MWRA	MWRA
SEA CONSULTANTS, INC	1986	MWRA RMFP INTERIM REPORT NO. 3 METHODOLOGY OF EVALUATING ALTERNATIVES: FINAL	SEA CONSULTANTS, INC	ERT
SEA CONSULTANTS, INC	1981	REPORT ON EVALUATION OF SCREENINGS HANDLING OF PUMPING STATIONS AND COMBINED SEWER OVERFLOW FACILITIES	MDC	MWRA
SEA CONSULTANTS, INC.	1981	EVALUATION OF SCREENINGS HANDLING AT PUMPING STATIONS AND COMBINED SEWER OVERFLOW FACILITIES	MDC	MWRA
SEA CONSULTANTS, INC.	1985	MASSACHUSETTS WATER RESOURCES AUTHORITY RESIDUALS MANAGEMENT FACILITIES - INTERIM REPORT NO. 2, INITIAL SCREENING OF ALTERNATIVES	SEA CONSULTANTS, INC.	
SEA CONSULTANTS, INC.	1985	MASSACHUSETTS WATER RESOURCES AUTHORITY RESIDUAL MANAGEMENT FACILITIES PLAN - INTERIM REPORT NO. 1 REVISED DRAFT	SEA CONSULTANTS, INC.	
SHEN, T.T.	1979	AIR POLLUTANTS FROM SEWAGE SLUDGE INCINERATION (P. 61-74)	JOUR OF THE ENV.ENG.DIV. ASCE (VOL 105)	ERT
SHIPLEY,RJ,JR., PARKER,GM AND BRUNNER,CR	1986	INCINERATION OF HOT SLUDGE (P. 205-210)	'86 NATIONAL WASTE PROCESSING CONFERENCE	ERT
STONE AND WEBSTER	1985	INTERIM SLUDGE DISPOSAL STUDY	MDC	MWRA
SWANSON,GJ AND BERGSTEDT,DC	1979	COAL AS A SUPPLEMENTAL HEAT SOURCE IN SLUDGE INCINERATION (P 1897-1903)	JOURNAL WPCR VOL 51 NO 7	ERT
SYSTECH CORP	1986	EVALUATION OF A FLUIDIZED-BED SEWAGE SLUDGE INCINERATOR USING WOOD CHIPS FOR FUEL	US EPA CONTRACT 600/2-86-044	ERT
TANZOSH, FJ	1984	NEW UNITS GIVE BOOST TO SLUDGE INCINERATION (P 26-29)	CHEMICAL ENGINEERING	ERT
TEKEDA,N AND HIRAOKA,M	1976	COMBINED PROCESS OF PYROLYSIS AND COMBUSTION FOR SLUDGE DISPOSAL (P 1147-1150)	ENVIRONMENTAL SC AND TECH (VOL 10)	ERT

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TRW	1980	HEALTH IMPACTS EMISSIONS & EMISSION FAC FOR NONCRITERIA POLL SUBJ TO DE MINIMIS GIDLINS & EMITTED FROM STAT CONVEN COMBUS PROCESS	US EPA CONTRACT 450/2-80-074	ERT
URBAN SYSTEMS RESEARCH AND ENGINEERING INC	1984	COMPARISON OF ALTERNATIVES FOR DISPOSAL OF SLUDGE FROM MDC'S DEER & NUT IS PRIMARY WASTEWATER TREATMENT PLANTS DRAFT	EOEA	MWRA
US DEPART OF INTERIOR FISH AND WILDLIFE SERVICE	1979	NATIONAL WETLAND INVENTORY INFORMATION AND LEGEND FOR MAP PRODUCTS	US DEPART OF THE INTERIOR	ERT
US EPA	1985	FUEL EFFICIENT INCINERATION FOR DISPOSAL OF SEWAGE SLUDGE	US EPA CONTRACT 600/D-85/099	ERT
US EPA	1985	FINAL ENVIRONMENTAL IMPACT STATEMENT: SITING OF WASTEWATER TREATMENT FAC FOR BOSTON HAR VOL III: PUBLIC PART AND RESPONSE TO COMM	US EPA	MWRA
US EPA	1985	FINAL ENVIRONMENTAL IMPACT STATEMENT: SITING OF WASTEWATER TREATMENT FACILITIES FOR BOSTON HARBOR VOL II: TECHNICAL EVALUATIONS	US EPA	MWRA
US EPA	1985	FINAL ENVIRONMENTAL IMPACT STATEMENT: SITING OF WASTEWATER TREATMENT FACILITIES FOR BOSTON HARBOR VOLUME I: COMPREHENSIVE SUMMARY	US EPA	MWRA
US EPA EMISSION STANDARDS AND ENGINEERING DIVISION	1984	SECOND REVIEW OF STANDARDS OF PERFORMANCE FOR SEWAGE SLUDGE INCINERATORS	US EPA CONTRACT 450/3-84-010	ERT
US EPA ENVIRONMENTAL SCIENCES RESEARCH LAB	1984	CHEMICAL AND PHYSICAL CHARACTERIZATION OF MUNICIPAL SLUDGE INCINERATOR EMISSIONS	US EPA CONTRACT 600/3-84-047	ERT
US EPA OFF OF MUNICIPAL POLLUTION CONTROL	1985	MULTIPLE - HEARTH AND FLUID BED SLUDGE INCINERATORS: DESIGN AND OPERATIONAL CONSIDERATIONS	US EPA CONTRACT 430/9-85-002	ERT
US EPA REGION I	1979	FINAL ENVIRONMENTAL IMPACT STATEMENT MDC PROPOSED SLUDGE MANAGEMENT PLAN METRO DIST COMM BOSTON MA PART A PART B VOL I AND II	MWRA	MWRA
US EPA REGION I	1985	FINAL ENVIRONMENTAL IMPACT STATEMENT SITING OF WASTEWATER TREATMENT FAC.FOR BOSTON HARBOR VOL III PUB.PART. AND RESP. TO COMMENTS	MWRA	MWRA
US EPA, REGION I, JRB ASSOCIATES	1985	AUDIT OF PRETREATMENT PROGRAM METROPOLITAN DISTRICT COMMISSION BOSTON, MA	EPA CONTRACT NO. 68-01-7043	MWRA
USDA SOIL CONSERVATION SERVICE	1969	SOIL SURVEY OF PLYMOUTH COUNTY, MA	USDA	ERT
USDA SOIL CONSERVATION SERVICE	1985	SOIL SURVEY OF WORCESTER COUNTY, MA: NORTHEASTERN PARK	USDA	ERT
USEPA OIL AND SPE MAT CON DIV MARINE PROTEC BRANCH	1980	FINAL ENVIRONMENTAL IMPACT STATEMENT FOR 106-MILE OCEAN WASTE DISPOSAL SITE DESIGNATION	USEPA CONTRACT NO. 68-01-4610	MWRA
USEPA OIL AND SPEC.MAT.CONTROL DIV, MARINE PRO.DIV	1980	FINAL ENVIRONMENTAL IMPACT STATEMENT ON THE 106-MILE OCEAN WASTE DISPOSAL SITE DESIGNATION	EPA CONTRACT 68-01-4610	MWRA
VERSER INC	1986	RHODE ISLAND TOXICS INTEGRATION PROJECT FINAL REPORT	RI DEPT OF ENVIRONMENTAL MANAGEMENT	ERT
WALL, HO AND FARRELL, J.B.	1979	PARTICULATE EMISSIONS FROM MUNICIPAL WASTE WATER SLUDGE INCINERATORS	AIR POLLUTION CONTROL ASSOCIATION	ERT
WHITMORE, F. (VERSAR, INC)	1976	DESTRUCTION OF PCB IN SEWER SLUDGE DURING INCINERATION	US EPA NTIS #PB-258-162	ERT
WSZOLEK, PATRICIA AND T. WACHS	1982	OCCURRENCE OF POLYCHLOROMATIC HYDROCARBONS IN MUNICIPAL SEWAGE SLUDGE AHES (P.69-72)	ARCH. ENVIRONM. CONTAM TOXICOL. (VOL II)	ERT
ZANONI, AE AND MUELLER, DL	1982	CALORIFIC VALUE OF WASTEWATER PLANT SLUDGES (P187-195)	JOUR OF ENVIR ENG DIV PRO OF ASCE-VOL108	ERT

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ASHLAND, MA PLANNING BOARD	1986	ZONING MAP TOWN OF ASHLAND, MA	ERT	ASHLAND, MA	1:1200
BEDFORD, MA PLANNING BOARD	1985	ZONING DISTRICTS TOWN OF BEDFORD, MA	ERT	BEDFORD, MA	1:1200
BETTS, RICHARD B. - TOWN ENGINEER	1982	ZONING MAP OF THE TOWN OF BELMONT, MA	ERT	BELMONT, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - SOUTH DORCHESTER	ERT	S. DORCHESTER	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON - NORTH DORCHESTER	ERT	N DORCHESTER, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - JAMAICA PLAIN	ERT	JAMAICA PLAIN	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA ROSLINDALE	ERT	ROSLINDALE, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - WEST ROXBURY	ERT	W. ROXBURY, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - HYDE PARK	ERT	HYDE PARK, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - ROXBURY	ERT	ROXBURY, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - BOSTON PROPER	ERT	BOSTON, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - SOUTH BOSTON	ERT	S. BOSTON, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - CHARLESTOWN	ERT	CHARLESTOWN, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON - EAST BOSTON	ERT	EAST BOSTON, MA	1:800
BOSTON, MA ZONING COMMISSION	1962	ZONING DISTRICTS CITY OF BOSTON, MA - BRIGHTON	ERT	BRIGHTON, MA	1:800
CITY OF CHELSEA, MA	1986	CITY OF CHELSEA, MA PROPOSED ZONING MAP CHANGES	ERT	CHELSEA, MA	
COMEY, ARTHUR C. - CITY PLANNER	1986	ZONING MAP OF THE TOWN OF BRAINTREE	ERT	BRAINTREE, MA	1:500
DEDHAM PLANNING BOARD	1976	ZONING MAP OF THE TOWN OF DEDHAM, MA	ERT	DEDHAM, MA	1:600
DEPARTMENT OF PLANNING	1981	ZONING MAP CITY OF MEDFORD, MA	ERT	MEDFORD, MA	1:600
DEPARTMENT OF PUBLIC WORKS	1886	ZONING MAP OF THE TOWN OF WEYMOUTH, MA	ERT	WEYMOUTH, MA	1:1200
DEPARTMENT OF PUBLIC WORKS	1985	MAP OF THE CITY OF WOBURN, MA ZONING	ERT	WOBURN, MA	1:1200
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	READING, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	LEXINGTON, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	MARLBORO, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	HOLLISTON, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	WEYMOUTH, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	BLUE HILLS, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	LYNN, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	MEDFIELD, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	BILLERICA, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	CONCORD, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	FRAMINGHAM, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	HULL, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	BROCKTON, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	NORWOOD, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	NATICK, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	NEWTON, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	MANSFIELD, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	WRENTHAM, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	BOSTON NORTH, M	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	WILMINGTON, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	READING, MA	1:24000
DEPT OF FORESTRY AND WILDLIFE MANAGEMENT	1971	LAND USE AND VEGETATIVE COVER MAPPING	ERT	BOSTON SOUTH	1:24000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	READING, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	LYNN, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	WRENTHAM, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	HOLLISTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	NORWOOD, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	HULL, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	BLUE HILLS, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	NORWOOD, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	LYNN, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCES AND AQUIFER INFORMATION OVERLAY	ERT	BLUE HILLS, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	WRENTHAM, MA	1:25000

AUTHOR	YEAR	TITLE	LOCATION	DIVISION	SCALE
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	MILFORD, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	NEWTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	READING, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	NEWTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	WEYMOUTH, MA	1:25,000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	WILMINGTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	CONCORD, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	MILFORD, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	BOSTON NORTH,MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	BOSTON NORTH,MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	NATICK, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	BOSTON SOUTH,MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	HOLLISTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	BEDFORD, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	MARLBOROUGH, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	MARLBOROUGH, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	LEXINGTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	WEYMOUTH, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	BOSTON SOUTH,MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	BROCKTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	BROCKTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	BILLERICA, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WATER SOURCE AND AQUIFER INFORMATION OVERLAY	ERT	FRAMINGHAM, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	NATICK, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	FRAMINGHAM, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	LEXINGTON, MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	BILLERICA,MA	1:25000
DEQE OFFICE OF PLANNING AND PROGRAM MNG.	1982	WASTE SOURCES AND DRAINAGE BASINS OVERLAY	ERT	CONCORD, MA	1:25000
ENGINEERING DEPARTMENT - WALTHAM, MA	1985	ZONING DISTRICT MAP OF WALTHAM, MA	ERT	WALTHAM, MA	1:1200
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	READING, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	WRENTHAM, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	WILMINGTON, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	WEYMOUTH, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	MANSFIELD, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	NORWOOD, MA	1:25,000
ERT	1986	MRWA RMFP TIER 1 OVERLAY	ERT	NEWTON, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	NATICK, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	MEDFIELD, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	MARLBOROUGH, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	HULL, MA	1:24,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	LYNN, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	LEXINGTON, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	CONCORD, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	HOLLISTON, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	FRAMINGHAM, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	BOSTON NORTH MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	BROCKTON, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	BOSTON SOUTH MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	BILLERICA, MA	1:25,000
ERT	1986	MWRA RMFP TIER 1 OVERLAY	ERT	BLUE HILLS, MA	1:25,000
FEDERAL EMERGENCY MANAGEMENT AGENCY	1976	FLOOD INSURANCE RATE MAP - PANELS: 1, 2	ERT	HOLBROOK, MA	1:1000
FEDERAL EMERGENCY MANAGEMENT AGENCY	1977	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	MALDEN, MA	1:800
FEDERAL EMERGENCY MANAGEMENT AGENCY	1978	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	WAKEFIELD, MA	1:800
FEDERAL EMERGENCY MANAGEMENT AGENCY	1978	FLOOD INSURANCE RATE MAP - PANELS: 1, 2	ERT	WALPOLE, MA	1:400

AUTHOR	YEAR	TITLE	LOCATION	DIVISION	SCALE
FEDERAL EMERGENCY MANAGEMENT AGENCY	1978	FLDDD INSURANCE RATE MAP - PANELS: 5, 10	ERT	SHARON, MA	1:1000
FEDERAL EMERGENCY MANAGEMENT AGENCY	1979	FLOOD INSURANCE RATE MAP - PANELS: 5,10	ERT	WELLESLEY, MA	1:800
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4, 5	ERT	WOBURN, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4, 5, 6, 7, 8, 9	ERT	WEYMOUTH, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	NORWOOD, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4, 5, 6	ERT	SHERBORN, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 5, 10	ERT	LYNNFILED, MA	1:800
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 5,10	ERT	DOVER, MA	1:800
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4, 5	ERT	RANDOLPH, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1, 2	ERT	WATERTOWN, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 4, 5, 6	ERT	WESTON,MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1980	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4, 5, 6, 7	ERT	NATICK, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1981	FLOOD INSURANCE RATE MAP - PANELS: 1, 2	ERT	ASHLAND, MA	1:600
FEDERAL EMERGENCY MANAGEMENT AGENCY	1981	FLOOD INSURANCE RATE MAP - PANELS: 2, 3, 4	ERT	SOUTHBOROUGH, M	1:600
FEDERAL EMERGENCY MANAGEMENT AGENCY	1981	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4	ERT	READING, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	BELMONT, MA	1:500
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	DEDHAM, MA	1:1000
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	ARLINGTON, MA	1:500
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	CHELSEA, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLOOD INSURANCE RATE MAP - PANELS: 1, 2	ERT	WILMINGTON, MA	1:600
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLOOD INSURANCE RATE MAP - PANELS: 2, 3, 4	ERT	STOUGHTON, MA	1:600
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3	ERT	CAMBRIDGE, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1982	FLDOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4	ERT	HOPKINTON, MA	1:600
FEDERAL EMERGENCY MANAGEMENT AGENCY	1983	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	LEXINGTON, MA	1:1000
FEDERAL EMERGENCY MANAGEMENT AGENCY	1983	FLOOD INSURANCE RATE MAP - PANELS: 1 - 28 (ONLY INDEX)	ERT	BOSTON, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1983	FLOOD INSURANCE RATE MAP - PANELS: 1, 3, 4, 5, 6	ERT	BEDFORD, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1984	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4	ERT	BURLINGTON, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1984	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	WESTWOOD, MA	1:800
FEDERAL EMERGENCY MANAGEMENT AGENCY	1984	FLOOD INSURANCE RATE MAP - PANELS: 1,2 3, 4	ERT	REVERE, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1984	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	WINTHROP	1:500
FEDERAL EMERGENCY MANAGEMENT AGENCY	1984	FLOOD INSURANCE RATE MAP - PANELS: 1, 3, 4, 5	ERT	WALTHAM, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1985	FLOOD INSURANCE RATE MAP - PANELS: 2, 4, 8, 12, 15, 16	ERT	QUINCY, MA	1:500
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 1, 3	ERT	MELROSE, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 4, 5, 6, 7, 8, 9	ERT	FRAMINGHAM, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 1, 3, 4, 5, 6, 7, 8, 9, 10	ERT	HINGHAM, MA	1:400
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 1, 2	ERT	SOMERVILLE, MA	1:500
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 5, 10	ERT	LINCOLN, MA	1:1000
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 1, 2, 3, 4, 5	ERT	NEWTON, MA	1:500
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	MEDFORD, MA	1:500
FEDERAL EMERGENCY MANAGEMENT AGENCY	1986	FLOOD INSURANCE RATE MAP - PANELS: 1	ERT	EVERETT, MA	1:500
HIGGINS, ROBERT L. - TOWN ENGINEER	1986	ZONING DISTRICT MAP TOWN OF WILMINGTON, MA	ERT	WILMINGTON, MA	1:1200
HINGHAM, MA PLANNING BOARD	1983	TOWN OF HINGHAM, MA	ERT	HINGHAM, MA	
KENNEDY, GENE AND JOHN SIMMONS	1983	ZONING DISTRICTS CITY OF NEWTON, MA	ERT	NEWTON, MA	1:1000
LYNN CITY PLANNING BOARD	1982	ZONING MAP CITY OF LYNN, MA	ERT	LYNN, MA	1:800
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	BEDFORD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	NORWOOD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	MEDFIELD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	LYNN, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	HOLBROOK, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WELLINGTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WESTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	STOUGHTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	READING, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	QUINCY, MA	1:24000

AUTHOR	YEAR	TITLE	LOCATION	DIVISION	SCALE
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	ASHLAND, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	NEWTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	FRAMINGHAM, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WOBURN, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WEYMOUTH, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WATERTOWN, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	LEXINGTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	HULL, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	BURLINGTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	BRAINTREE, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	BILLERICA, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	WEYMOUTH, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	RANDOLPH, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	WILMINGTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	NORWOOD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	SOMERVILLE, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	NEWTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	BELMONT, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	NATICK, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WALTHAM, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	MARLBOROUGH, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	CHELSEA, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	MILFORD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	CANTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	MEDFIELD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WALPOLE, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	MANSFIELD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	NEEDHAM, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	LYNN, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WILMINGTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	LEXINGTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	WRENTHAM, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	REVERE, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WINTHROP, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	WINTHROP, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	HINGHAM, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	BLUE HILLS, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	EVERETT, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	BOSTON NORTH, M	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	CHARLESTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	BOSTON SOUTH, M	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	READING, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	DEDHAM, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	BOSTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	ERT	WAKFIELD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASSACHUSETTS HISTORICAL COMMISSION HISTORICAL REGISTRY INVENTORY	MHC BOSTON	MILFORD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	BROCKTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	CONCORD, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	FRAMINGHAM, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	HOLLISTON, MA	1:24000
MASSACHUSETTS HISTORICAL COMMISSION	1986	MASS HISTORICAL COMMISSION ARCHEOLOGICAL INVENTORY	NHP BOSTON	HULL, MA	1:24000
NADEAU, ALFRED J. TOWN ENGINEER	1985	TOWN OF BURLINGTON, MA ZONING MAP	ERT	BURLINGTON, MA	1:1200
NATICK PLANNING DEPARTMENT	1985	ZONING MAP OF THE TOWN OF NATICK, MA	ERT	NATICK, MA	1:1000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	WRENTHAM, MA	1:24000

AUTHOR	YEAR	TITLE	LOCATION	DIVISION	SCALE
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	WILMINGTON, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	WEYMOUTH, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	READING, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	NORWOOD, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	NEWTON, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	MILFORD, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	MEDFIELD, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	MARLBOROUGH, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	FRAMINGHAM, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	LYNN, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	NATICK, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	LEXINGTON, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	MANSFIELD, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	CONCORD, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	BROCKTON, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	BOSTON SOUTH, M	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	BOSTON NORTH, M	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	BLUE HILLS, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	HOLLISTON, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	HULL, MA	1:24000
NATURAL HERITAGE PROGRAM	1986	MASSACHUSTEES NATURAL HERITAGE PROGRAM RARE SPECIES INVENTORY	NHP BOSTON	BILLERICA, MA	1:24000
NEEDHAM, MA PLANNING BOARD	1984	ZONING MAP OF THE TOWN OF NEEDHAM, MA	ERT	NEEDHAM, MA	1:1000
OATES, KENNETH B. - TOWN ENGINEER	1980	ZONING MAP WESTON, MA	ERT	WESTON, MA	1:1600
PLANNING BOARD OF CANTON, MA	1984	TOWN OF CANTON, MA (ZONING)	ERT	CANTON, MA	1:1000
PLANNING BOARD TOWN OF HOLBROOK, MA	1971	MAP OF HOLBROOK, MA ZONING DISTRICTS	ERT	HOLBROOK, MA	1:1000
ROMANO, ALBERT REGISTERED LAND SURVEYOR	1983	CITY OF REVERE, MA ZONING MAP	ERT	REVERE, MA	1:530
RYAN, WALTER R.- TOWN ENGINEER	1985	ZONING MAP OF THE TOWN OF NORWOOD, MA	ERT	NORWOOD, MA	1:800
SAUGUS, MA ENGINEERING DEPARTMENT	1978	ZONING MAP TOWN OF SAUGUS, MA ESSEX COUNTY	ERT	SAUGUS, MA	1:1000
SERGEANT, FRED - TOWN ENGINEER	1984	ZONING MAP TOWN OF FRAMINGHAM, MA	ERT	FRAMINGHAM, MA	1:1600
SHARON PLANNING BOARD	1983	TOWN OF SHARON, MA ZONING MAP	ERT	SHARON, MA	1:1600
SOMERVILLE PLANNING BOARD	1984	ZONING MAP CITY OF SOMERVILLE	ERT	SOMERVILLE, MA	1:600
TOWN BOARD HOPKINTON, MA	1985	ZONING MAP TOWN OF HOPKINTON, MA	ERT	HOPKINTON, MA	:3000
TOWN BOARD OF MILTON, MA	1986	MAP OF MILTON, MA SHOWING ZONING DISTRICTS	ERT	MILTON, MA	1:600
TOWN OF CONCORD	1982	TOWN OF CONCORD ZONING DISTRICTS	ERT	CONCORD, MA	1:1000
TOWN OF QUINCY, MA	1986	QUINCY, MA ZONING MAP	ERT	QUINCY, MA	1:800
TOWN OF RANDOLPH, MA	1986	ZONING MAP FOR THE TOWN OF RANDOLPH, MA	ERT	RANDOLPH, MA	1:800
TOWN OF READING, MA	1983	READING PLANNING BOARD ZONING MAP	ERT	READING, MA)	1:800
TOWN OF STOUGHTON, MA	1984	ZONING MAP OF THE TOWN OF STOUGHTON, MA MAP C	ERT	STOUGHTON, MA	1:400
UNITED STATES DEPARTMENT OF AGRICULTURE	1969	SOILS CONSERVATION SERVICE SOIL SURVEY	SCS	PLYMOUTH COUNTY	
UNITED STATES DEPARTMENT OF AGRICULTURE	1985	SOILS CONSERVATION SERVICE SOIL SURVEY	SCS	WORCESTER CO	
UNITED STATES DEPARTMENT OF AGRICULTURE	1987	SOILS CONSERVATION SERVICE SOIL SURVEY	SCS TAUNTO	NORFOLK COUNTY	
UNITED STATES DEPARTMENT OF AGRICULTURE	1987	SOILS CONSERVATION SERVICE SOIL SURVEY	SCS	MIDDLESEX CO	
UNITED STATES DEPARTMENT OF AGRICULTURE	1987	SOILS CONSERVATION SERVICE SOIL SURVEY	SCS	ESSEX, COUNTY	
UNITED STATES DEPARTMENT OF AGRICULTURE	1987	SOILS CONSERVATION SERVICE SOIL SURVEY	SCS TAUNTO	SUFFOLK COUNTY	
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	BLUE HILLS, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	WRENTHAM, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	LYNN, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	WEYMOUTH, MA	1:60,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	NATICK, MA	1:60,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	NORWOOD, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	LEXINGTON, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	NATICK, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	HULL, MA	1:60,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	MEDFIELD, MA	1:83,000

AUTHOR	YEAR	TITLE	LOCATION	DIVISION	SCALE
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	FRAMINGHAM, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	HOLLISTON, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	MANSFIELD, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	BILLERICA, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	READING, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	CONCORD, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	MILFORD, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	MARLBOROUGH, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	NEWTON, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	WILMINGTON, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	FRAMINGHAM, MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	BOSTON NORTH MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	BOSTON SOUTH MA	1:80,000
US FISH AND WILDLIFE SERVICE	1977	NATIONAL WETLANDS INVENTORY	ERT	BROCKTON, MA	1:80,000
USGS	1970	USGS TOPOGRAPHIC MAP	ERT	NATICK, MA	1:25,000
USGS	1970	USGS TOPOGRAPHIC MAP	ERT	NEWTON, MA	1:25,000
USGS	1970	USGS TOPOGRAPHIC MAP	ERT	LYNN, MA	1:25,000
USGS	1970	USGS TOPOGRAPHIC MAP	ERT	MA,NH,CN,RI,ME	1:250,000
USGS	1971	USGS TOPOGRAPHIC MAP	ERT	LEXINGTON, MA	1:25,000
USGS	1971	USGS TOPOGRAPHIC MAP	ERT	HULL, MA	1:24,000
USGS	1975	USGS TOPOGRAPHIC MAP	ERT	BROCKTON, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	WRENTHAM, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	WILMINGTON, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	WEYMOUTH, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	NORWOOD, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	MARLBOROUGH, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	MANSFIELD, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	READING, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	BOSTON SOUTH MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	HOLLISTON, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	CONCORD, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	MEDFIELD, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	BLUE HILLS, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	BILLERICA, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	FRAMINGHAM, MA	1:25,000
USGS	1979	USGS TOPOGRAPHIC MAP	ERT	BOSTON NORTH, MA	1:25,000
WAKEFIELD TOWN PLANNING BOARD	1965	GENERAL AND ZONING MAP FOR TOWN OF WAKEFIELD, MA	ERT	WAKEFIELD, MA	1:1000
WALPOLE PLANNING BOARD	1984	ZONING DISTRICT MAP OF THE TOWN OF WALPOLE, MA	ERT	WALPOLE, MA	1:800
WATERTOWN PLANNING BOARD	1984	WATERTOWN, MA ZONING MAP	ERT	WATERTOWN, MA	1:1600
WAYLAND ENGINEERING DEPARTMENT	1980	ZONING MAP OF THE TOWN OF WAYLAND, MA	ERT	WAYLAND, MA	1:1000
WELLESLEY PLANNING BOARD	1980	ZONING MAP OF TOWN OF WELLESLEY, MA	ERT	WELLESLEY, MA	1:800
WESTWOOD PLANNING BOARD	1984	ZONING MAP TOWN OF WESTWOOD, MA	ERT	WESTWOOD, MA	1:1000
WINTHROP, MA PLANNING BOARD	1983	STREET AND ZONING PLAN OF THE TOWN OF WINTHROP, MA	ERT	WINTHROP, MA	1:800

APPENDIX A

SITE SCREENING CRITERIA FOR THE RESIDUALS MANAGEMENT FACILITIES PLAN

SITE SCREENING CRITERIA FOR THE RESIDUALS MANAGEMENT FACILITIES PLAN

Introduction and Background

The Residuals Management Facilities Plan (RMFP) is one of a series of related efforts by the Massachusetts Water Resources Authority (MWRA) to improve the environmental, aesthetic, and recreational quality of Boston Harbor, Massachusetts Bay, and the coastal communities of eastern Massachusetts. As a significant part of this effort, the MWRA needs to identify, and then evaluate, potential sites for new facilities that will process the residuals (sludge) that are a byproduct of treating municipal wastewater.

The site screening process is being performed in a manner that is consistent with the requirements of the Special Procedure issued by the Secretary of Environmental Affairs for development of the RMFP. By helping to achieve compliance with Massachusetts environmental standards, the site screening analysis will contribute significantly to the satisfaction of environmental review and compliance regulations of DEQE construction grants for facilities planning. The process is to be conducted in four "tiers" or stages as listed in the table below:

Evaluation Tier	Beginning Point	Key Steps	Result
1. Site Screening Analysis	~300 sites	• site ordering through screening process	ordered list of sites
2. Candidate Options Identification	ordered list of sites	• site acquisition evaluation • merge sites and technologies	small number of candidate options (sites and technologies)

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3.	Candidate Options Evaluation	small number of candidate options (sites & technologies)	o	environmental and engineering assessment	1 preferred RMFP option and 1-2 alternates
4.	Final Options Analysis	1 preferred RMFP option and 1-2 alternates	o	refined site specific engineering and environmental assessment	final selection of option for implementation

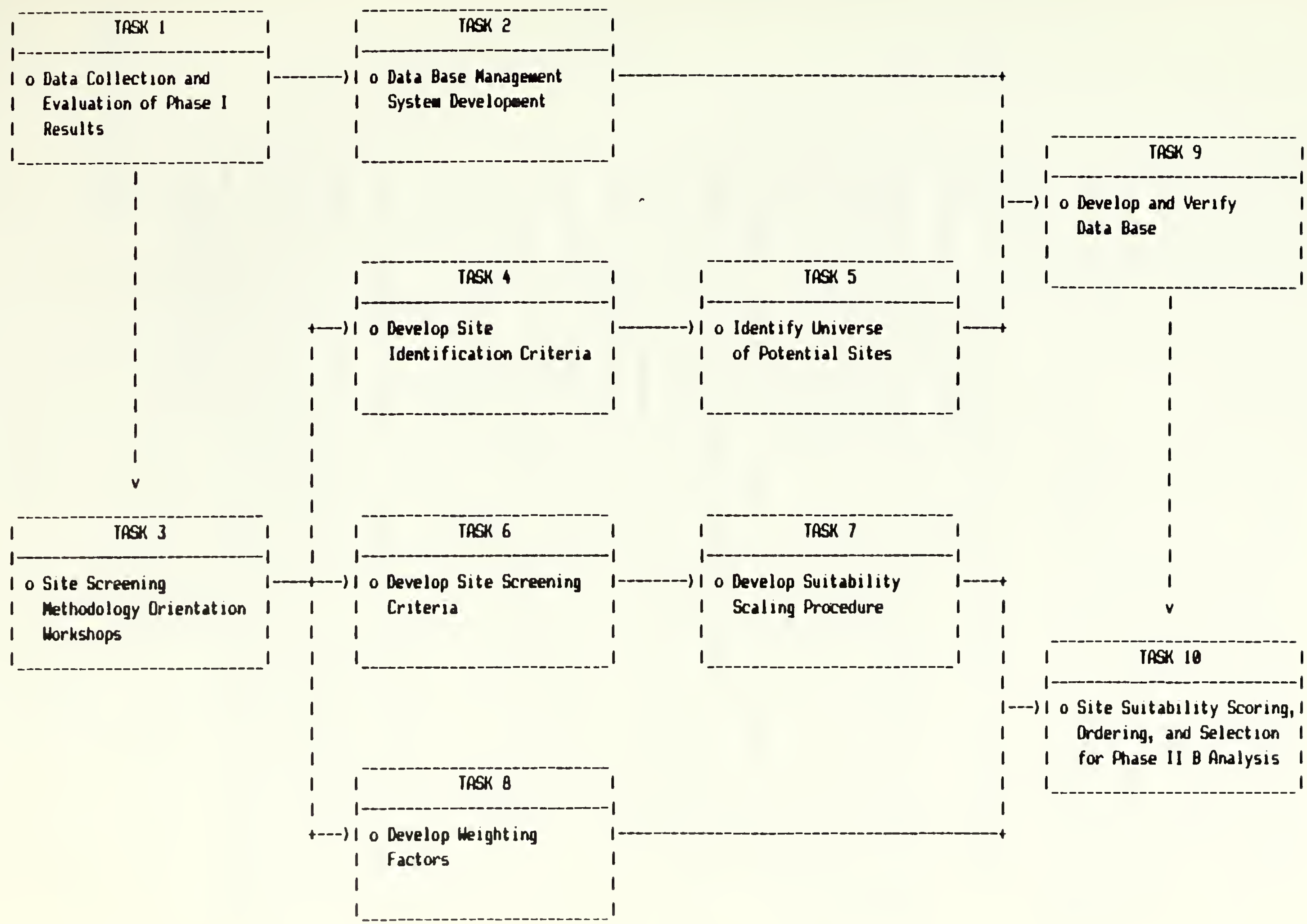
Site Screening Analysis

Tier 1 in the overall siting process is referred to as the Site Screening Analysis. The primary objectives of the Site Screening Analysis are to identify and assemble data on a universe (300±) of candidate sites and to screen those sites in as objective, consistent and defensible a manner as possible to an ordered listing of sites based on relative environmental and technical suitability as locations for one or more of the major residuals management program functions. It is also an objective of the Site Screening Analysis to provide adequate opportunity for the MWRA Board of Directors, the involved regulatory agencies, and Citizens Advisory Committees (CAC) to review interim results throughout the process, and participate directly in the site screening effort.

A flow chart illustrating the RMFP site screening analysis process is presented in Figure 1. A summary of the major steps, or tasks, is provided below:

1. Review Phase I work and identify major data sources that provide information on potential site locations to enable differentiation of site capabilities.

Figure 1. Site Screening Process Diagram



3. Present a series of workshops (MWRA staff, Board, CAC, regulatory agencies, other interested groups) to provide information and solicit input on the siting process and criteria.
4. Develop site identification criteria that define minimum requirements for a potential site to be considered for use in the residuals management facilities plan. At the present time the site identification criteria consist of location (within the Commonwealth of Massachusetts) and minimum size (5 acres for sludge transfer only; 8 acres for sludge processing).
5. Based on the identification criteria, define the universe of potential sites.
6. Develop site screening criteria based on experience, engineering judgement, applicable environmental and public health regulations, and stated preferences and policies of the MWRA. The objective of applying the criteria will be to ascertain differences in the suitability for supporting residuals management facilities, and identify a smaller, workable list of those sites deemed to be more technically and environmentally favorable.
7. Establish a scale that relates criteria to suitability for siting. The result here is a suitability scale for each criterion (0 = least suitable, 10 = most suitable).
8. Develop weighting factors that specify the relative importance of each attribute group in determining the overall suitability of a site. These weighting factors will be developed by soliciting opinions on the relative importance of the criteria, by means of an attitudinal survey conducted during the workshops listed in Task 3.

9. Develop, and verify by field inspection, the necessary data on the site universe to enable evaluation of the relative suitability of each site.
10. Order the sites from most suitable to least suitable based on the siting criteria.

Report Objectives

This report presents the site screening criteria (Task 6) that have been developed for the Tier 1 Site Screening Analysis. For each screening criterion, a suitability scale that relates criteria to suitability for siting (Task 7) is presented. The following topics are discussed for each screening criterion: the suitability scale; key issues and considerations; data requirements for site suitability determinations; and, a summary of existing data sources being used to evaluate site suitability.

Site Screening Criteria

Site screening criteria have been developed to enable relative comparisons to be made of the ~ 300 universe of candidate sites based on their ability to accommodate a residuals management facility, independent of any particular technology. The site screening criteria that have been chosen for this analysis are presented in Table 1. This list has been formulated based largely on MEPA requirements regarding the description of the environment of an area likely to be affected by a proposed project. MEPA EIR regulations require a description of the physical, biological, economic and social conditions of the site, its immediate surroundings, and the region. Characteristics typically discussed include:

(a) topography, geology, and soils;
(b) surface and groundwater hydrology and quality;

TABLE 1

SCREENING CRITERIA AND SITE EVALUATION FEATURES

Screening Criteria	Site Evaluation Feature
Engineering Considerations	• Base soil type and characteristics • Topography • Depth to Bedrock • Potential for on-site contamination
Noise Environment	• Proximity to sensitive receptors • Proximity to existing major noise sources
Land Use	• Current site use • Neighboring land use • Proximity to sensitive receptors • Community development objectives
Cultural Resources	• Proximity to historical resources • Proximity to archeological resources
Transportation/ Traffic	• Site rail access • Site coastal access • Site roadway access • Current traffic conditions
Surface Water	• Proximity to water bodies • Proximity to 100 year flood zones • Water quality classification
Ground Water	• Aquifer presence • Well yield potential • Proximity to drinking water wells
Wetlands	• Presence of on-site wetlands • Proximity to off-site wetlands
Ecology	• Presence of threatened or endangered species • Terrestrial ecological habitats • Aquatic ecological habitats
Air Quality/Odors	• Impact area characteristics • Dispersion characteristics • Existing air quality and emissions sources

Source: ERT, 1987

(c) plant and animal species and ecosystems;

(d) traffic, air quality, and noise

(e) scenic qualities, open space, and recreation resources;

(f) historical and archeological resources;

(g) the built environment and use of the area; and

(h) rare or unique features of the site and its environs.

The above list is that contained in the proposed MEPA regulations 301 CMR 11.07 (5). As noted by the Secretary this list of factors is meant as a guide. Other factors may prove significant for some projects and some of the listed factors may prove insignificant. Also taken into consideration in developing the screening criteria presented in Table 1 was the experience of the project team in the performance of siting studies and applicable environmental and public health regulations.

SITE SUITABILITY SCORING PROCEDURE

Suitability Scales

A numerical scoring system has been developed to enable an objective and consistent ordering of sites based on their relative suitability for use in the RMFP. For each of the screening criteria shown in Table 1, a site suitability scale has been developed. The suitability scales reflect separate ranges of numerical scores (0 to 10) for each of the site screening criteria. In each suitability scale: a "0" score represents the least suitable set of site features expected to be encountered in the site universe; a "5" score represents the anticipated average set of site features; and, a "10" score represents the most suitable set of site features expected in the site universe.

For each screening criterion, identified in Table 1, available data have been assembled and reviewed for the site universe. These data, which have been verified by field inspection, were used to develop the site suitability scales that are presented later in this document. Thus, the 0 to 10 scales for each screening criteria represent a means to evaluate the suitability of a given site relative to all other sites in the site universe. This will enable a relative ordering of sites which will allow an unbiased means of selecting a smaller subset of sites to be further evaluated in the next phase (tier 2) of the RMFP analysis, (Candidate Options Evaluation).

Overall (Weighted) Suitability Scores

Each site will receive a separate suitability score for each of the 10 screening criteria identified in Table 1, based on the appropriate data gathered and field verified for each site. The suitability scores for each site will depend on the suitability scales defined in this report, and the professional judgement of the technical team as to how each site matches up against those criteria.

Once each site has been assigned a separate suitability score (ranging from 0 to 10) for each screening criterion, an overall (weighted) suitability score will be computed for each site by weighting each individual criterion's suitability score with the appropriate weighting factor (developed using an attitudinal survey technique in a separate task) and summing the weighted scores. The result here will be a maximum potential score of 100 points. The weighting factors will reflect the relative importance of each criterion in defining overall site suitability.

The sites will be ordered from the most potentially suitable to the least potentially suitable based on their overall (weighted) suitability score. Selection of sites for further consideration will be based on the site ordering, following a statistical analysis of the overall (weighted) suitability scores.

Report Organization

The remainder of this report is organized by site screening criterion, as identified in Table 1. For each criterion, the following information is discussed:

- key issues and considerations;
- data requirements for site suitability determinations and a summary of existing data sources being used to evaluate site suitability;
- the suitability scale that will be used to assign a site suitability score to each site.

ENGINEERING CONSIDERATIONS

Key Issues

From an engineering perspective, a number of geological/soils considerations differentiate sites in terms of suitability. For example: sites with severe slopes would have limited development potential; those with moderate slopes may be developable, but may entail extensive excavation and grading; those with mild slopes would be more ideal. Similarly, sites dominated by organic soils may require substantial amounts of fill to support foundations; those with bedrock near the surface may require extensive blasting; and, those previously contaminated by hazardous waste may require costly cleanups prior to development.

Evaluation of sites relative to the Engineering Considerations criterion will focus on the following site features:

- Base soil in terms of suitability for foundations and drainage characteristics;
- The site topography;
- Depth to bedrock as it may affect the need for, and extent of blasting; and,
- Previous contamination of the soil.

Data Resources

The information needed to evaluate the relative suitability of sites in terms of Engineering Considerations can be obtained from the following sources:

- USGS topographical maps;
- USGS bedrock geology maps;
- DEQE hazardous waste site maps;
- SCS soil surveys; and,
- Soil boring records (where available)

Site Suitability Scale

The site suitability scale for engineering considerations is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Base Soils	2
• Topography	3
• Depth to Bedrock	2
• Potential for On-Site Contamination	3
Total	10

Site suitability scales for each of the site features associated with engineering considerations are presented below. The engineering considerations suitability score assigned each site will be the sum of separate scores for each of these subcriteria.

Base Soils

Score	Descriptive Evaluation
1	• Site dominated by fine textured inorganic soils.
2	• Site dominated by medium textured inorganic soils.
0	• Site dominated by coarse textured soils with a substantial amount of organic material, clay or boulders.

Topography

Score	Descriptive Evaluation
3	• Site dominated by mild slopes (0-3%).
2	• Site dominated by moderate slopes (3-10%).
1	• Site dominated by moderately steep slopes (10-20%).
0	• Site dominated by steep slopes (> 20%).

Depth to Bedrock

Score	Descriptive Evaluation
2	• Greater than 10m
1	• 2m - 10m
0	• < 2m

Potential for On-Site Contamination

Potential for on-site contamination will be determined by professional judgement based on current site use, prior site use (if known), DEQE hazardous waste site maps, and observations made during the field reconnaissance surveys.

Score	Descriptive Evaluation
3	• No potential
2	• Limited potential
1	• High potential
0	• Observed on-site contamination and/or waste disposal.

NOISE ENVIRONMENT

Key Issues

In assessing the suitability of a site from a noise perspective, the following three elements are important:

- Who will be exposed to (or receive) the noise?
- What levels of noise are they currently exposed to?
- What are the characteristics of the noise transmission path?

The location of a noise source in relation to the location of a noise-sensitive land use is a critical factor in determining the potential impact of the new noise. Certain land use types (e.g., hospitals or convalescent homes) are much more sensitive to noise than other land use types (e.g., restaurants or bars). Thus, an important consideration in locating a potential noise source is the "noise sensitivity" of surrounding land use types and the presence of particularly sensitive receptors.

The current noise environment is important in locating a noise source since a community's perception of a new noise source will depend on the increase in noise level above ambient. The impact of a new noise source on existing noise levels is a logarithmic function. That is, the higher the existing noise levels the louder a new noise source would have to be before it would increase the existing noise level. Thus, presence of existing major noise sources (e.g., a highway or a factory) is a desirable feature in locating a new noise source.

Sound propagation from a source to a receiver depends upon the distance to the noise source and the presence of barriers that would attenuate the sound. Any barrier, natural or artificial, that blocks the line of site from the noise

source to the receptor will significantly attenuate noise. Thus, important features to examine in evaluating potential sites are distances to sensitive receptors and natural or artificial barriers that would effectively buffer the site from sensitive land uses.

The DEQE Noise Regulation is the key regulatory consideration for noise. Section 310 CMR 7.10 prohibits "unnecessary" noise emissions. DEQE has issued guidelines interpreting 310 CMR 7.10. A demonstration of compliance with these guidelines will be necessary to gain approval from DEQE. The guidelines state that a facility, during normal operating hours, shall not produce either of the following conditions:

1) An increase of more than 10 decibels (dBA) in the broad band ambient noise level
2) A puretone condition.*

Both criteria apply at the facility property boundary and the property line of the nearest inhabited building(s).

Data Resources

USGS topographic quadrangle maps and land use maps provide a general identification of surrounding land use, nearby major noise sources, and sensitive receptors. The field reconnaissance surveys will be important in the identification of both sensitive receptors as well as existing major noise sources.

*The audible noise spectrum can be broken down into a series of frequency intervals or octave bands. A puretone condition is when the sound level at one octave band exceeds the levels of the two adjacent bands by three or more decibels.

Site Suitability Scale

The site suitability scale for noise is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Proximity to sensitive noise receptors	6
• Proximity to existing noise sources	4
Total	10

An explanation of the above suitability scales for the site features associated with noise are presented below. The noise suitability score assigned each site will be the sum of the separate scores for each of the above subcriteria.

Sensitive Receptor Proximity

Sites will be evaluated based on their proximity to sensitive receptors and their degree of sensitivity. Various land uses have been classified below in terms of their sensitivity to noise. These classifications are based upon sensitivities correlated with actual noise levels and are commonly used in noise impact analyses:

Land Use	Sensitivity
Educational facilities Hospitals Convalescent homes Theatres Wildlife sanctuaries Churches	Very sensitive

Residences Resort hotels Outpatient clinics Preschools Recreation facilities	Sensitive
Cemeteries Country clubs Scientific testing Professional research Government services Restaurants and bars Motor inns General merchandising Professional offices Recreational vehicle parks	Moderately sensitive

The suitability scale for sensitive receptor proximity is provided below. A review distance of 1/2 km was selected based on prior attenuation modeling experience. Noise impacts beyond 1/2 km would not be expected to be significant for most residuals management facilities.

Score	Descriptive Evaluation
6	• No very sensitive, sensitive, or moderately sensitive receptors within 1/2 km of the site.
4	• No very sensitive or sensitive receptors within 1/2 km of the site. Moderately sensitive receptors buffered from site by topography and intervening land uses and do not abut the property.
2	• Very sensitive, sensitive, or moderately sensitive receptors within 1/2 km of the site. Receptors buffered from site by topography and intervening land uses and do not abut the property line.

[1]This table is abstracted from "Noise Impact Analysis," Vincent E. Mestre and David C. Wooten.

0 • Receptors within 1/2 km of site. Very sensitive, sensitive, or moderately sensitive receptors abut the property line.

Proximity of the Site to Existing Noise Sources

Sites will be evaluated based on their proximity to existing noise sources using the suitability scale offered below. Major noise sources include highways, heavy industry areas (e.g., factories), and airports. The review distances reflected below are based on prior attenuation modeling experience.

Score	Descriptive Evaluation
4	• Site is in close proximity (100 meters) to a major noise source.
3	• Site is within 1/4 km of a major noise source.
2	• Site is within 1/2 km of a major noise source.
0	• Site is more than 1/2 km from a major noise source.

LAND USE

Key Issues

There are both constraints and opportunities associated with a given site and its surrounding land uses. From a MEPA standpoint, a key consideration applicable to all sites will be zoning. Zoning reflects the communities' objectives for land use at a given site. Where town master plans exist, it is expected that they would be relatively consistent with zoning designations.

Additional considerations which can influence land use are MEPA requirements. MEPA requires a baseline and impact assessment of the built environment and man's use of the site, its immediate surroundings, and the region. Specific questions which MEPA requires to be addressed include:

- Might the project affect the condition, use, or access to any open space and/or recreation area?
- Has any portion of the site been in agricultural use within the last 15 years?
- Is the project consistent with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies?

MEPA also empowers the Secretary of Environmental Affairs to identify, designate and protect areas that are of critical concern. From a land use perspective, eligible areas include agricultural areas and special use areas (undeveloped or natural area, public recreation areas, or significant scenic sites). Regulatory considerations may also include restrictions pertaining to federal, state, and locally owned lands. The Coastal Zone Management Act establishes certain

permit requirements for development within specified coastal areas. These requirements are generally reflected in other state laws and land use management plans.

Compatibility with existing land uses in the site vicinity is perhaps the primary land use consideration in siting a facility; however in many cases it is also an attribute without clear regulatory standards or regulatory definitions of acceptability.

In determining site land use suitability, factors usually considered in Environmental Impact Assessments include:

- Is the proposed development consistent or of a similar nature with nearby land uses?
- Would land uses in proximity to the site be free of influence from the proposed facility?
- Would the proposed development be consistent with existing and projected land use trends in the community?
- Are neighboring lands intensively used, i.e., are there public institutions, recreation areas, or densely populated areas, in other words, are there sensitive receptors?
- Do land uses in close proximity represent unique resources?
- Would neighborhoods be disrupted or divided by proposed development?

Data Resources

Key data resources for land use screening are:

- USGS Maps
- Land Use Maps (MAPC)
- Zoning Maps
- Regional Open Space or Recreation Plans
- Town Master Plans
- Site Reconnaissance

Site Suitability Scale

The site suitability scale for land use is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Current site use	3
• Neighboring land use	3
• Sensitive receptor proximity	2
• Community development objectives	2
Total	10

The land use suitablity score for each site will be the sum of separate scores for each of the above subcriteria.

The land use scalings are defined below and consider not only the site, but neighboring land uses since the effect of a light or heavy industrial land use such as a residuals management facility on existing land uses would probably not be strictly confined to the area within the project's boundary. Commonly, a land use assessment includes at least a 1-km radius.

Current Site Use

Score	Descriptive Evaluation
3	• Site is undeveloped in an industrial area or is developed with abandoned structures in an industrial area.
2	• Site is undeveloped in an office or retail commercial area or is developed with abandoned structures in a non-residential area.

1 • Site is undeveloped in a residential or park area.

0 • Site is developed with on-going activity.

Neighboring Land Use

Score	Descriptive Evaluation
3	• Lands within 1 km predominately industrial and/or commercial (75% or more).
2	• Land uses within 1 km of site are mixed and do contain some residential land uses. However, residential areas are buffered from proposed site and do not directly abut the property line. More than 50% of lands surrounding the site are industrial, commercial, or vacant.
1	• Land uses within 1 km of the site are mixed: less than 50% are industrial, commercial, or vacant. Residential land uses are generally buffered from property line.
0	• Land uses within 1 km of the site are mixed: less than 50% are industrial, commercial, or vacant. Residential land uses are not buffered from property.

Other Sensitive Receptors

Score	Descriptive Evaluation
2	• No hospitals, designated recreational lands or open space, parks, institutions (schools, libraries) within 1 km of site.

1 • Hospitals, institutions, designated recreational lands, or open space or parks of low to moderate use lie within 1 km of the site, but do not abut the property line and are buffered from the facility.

0 • Hospitals, public institutions, or designated recreational lands of moderate to high use lie within 1 km of site and/or institutions, recreational lands, of any intensity of use, abut the property line.

Community Development Objectives

Score	Descriptive Evaluation
2	• Site is designated for industrial use in community master plan or zoning map.
1	• Site is designated for commericial or office use in community master plan or zoning map.
0	• Site is designated for residential, park or conservation area in community master plan or zoning map.

CULTURAL RESOURCES

Key Issues

Considerations which relate to cultural resources center around the National Historic Preservation Act of 1966 and the Massachusetts General Laws Chapter 9, Section 26c and 27c (950 CMR 71). These laws require that the effect of a development on any district, site, building, structure or object that is included in the National Register of Historic Places shall be taken into account prior to state or federal approval. MEPA also requires consideration of the archaeological or palenteological significance of a site.

On a screening level, the potential historical and archaeological significance of a site may be determined by the following considerations:

1) The presence or absence of sites listed on the National or State Registers of Historic Places, on site or in the vicinity[1].
2) Site's proximity to known archaeological resources.
3) Present site use. If site has no structures on site, but has a history of significant past disturbance indicating soil horizons have been destroyed (e.g., non-agricultural), archaeological and historic resources are not likely to be encountered on site.

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[1]The Register includes sites significant in history, architecture, archaeology and culture. It may include districts, sites, buildings, structures, and objects of state or local importance that posses integrity of design, location, setting, feeling and association; are associated with historical events; significant persons; embody the distinctive characteristics of a type, period or method of construction or which have yielded or which are likely to yield, information important in prehistory or history.

Data Resources

Key resources used in the site suitability screening for determining cultural significance and the site's suitability ranking with respect to this attribute are the National and State Register listings for the study area. The site survey of existing land uses also provides insight as to whether there is the possibility of undisturbed archaeological resources on site.

During more detailed Phase II-B Candidate Options Analysis the files of the Massachusetts Historical Commission (MHC) and the MHC's Inventory of Historic and Prehistoric Assets of the Commonwealth will be consulted. (The Inventory of assets documents archaeological resources, but may only be consulted in MHC's offices, and may not be reproduced. Thus, review of this resource for 300+ sites would be unwieldy, and must be deferred to Phase II-B.)

Site Suitability Scale

The site suitability scale for cultural resources is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Historical resources	6
• Archaeological resources	4
Total	10

The cultural resources suitability score assigned each site will be the sum of separate scores for the above subcriteria. In the above distribution of points, more points are assigned to historical resources than to archeological resources as use of a site would potentially impact archeological resources on that site only, but would potentially impact historical resources both on-site as well as those located on abutting properties and within the access corridor.

Historical Resources

Score	Descriptive Evaluation
6	• Site itself and area within 1 km of the site does not contain federal or state register listings.
4	• Site itself does not contain register properties. Area within 1 km does contain register properties. Properties are buffered from facility site, and do not share common access.
2	• Site itself does not contain register properties. Site abuts and shares common access to property containing register properties which are not buffered from the site
0	• Site contains register properties.

Archaeological Resources

Score	Descriptive Evaluation
4	• Majority of site area is developed, or has a history of use, thus existing archaeological resources would not likely be encountered on site.
2	• 25 to 50 percent of the site is developed, or has had a history of use.
0	• Majority of site is not developed or paved and there is no history or evidence of previous site use.

TRANSPORTATION/TRAFFIC

Key Issues

The transportation/traffic criteria is directed towards evaluating the accessibility of sites as determined by the physical and operating characteristics of the existing transportation systems. Consideration is given to three transport modes in the siting analysis: (1) truck access via the highway network, (2) rail, and (3) barge for coastal sites.

The application of the transportation/traffic criteria takes into account the following key issues associated with the transport of residuals from Deer Island to potential processing and disposal facilities:

(1) the proximity of the site locations to the existing highway and rail networks;
(2) the physical condition of the highway facilities serving each site;
(3) the operating capacities of highway facilities;
(4) the current demand on highway facilities;
(5) identifiable physical and/or safety limitations for highway facilities; and,
(6) availability of coastal access.

Data Resources

Information required for the traffic engineering component of the site suitability analysis will be obtained from the following sources:

- Traffic count data collected through the on-going MDPW state highway inventory program;

- Traffic data contained in community master plan reports;

- USGS topographic maps showing the existing roadway system

- Information compiled in study reports prepared by the Metropolitan Area Planning Council and the Central Transportation Planning Staff; and

- Observations made during the reconnaissance field surveys.

Site Suitability Scale

The site suitability scale for transportation/traffic is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Access to rail lines	2
• Access to coast	2
• Site roadway access	3
• Traffic operations level of service	3
Total	10

The transportation/traffic suitability score assigned to each site will be the sum of separate scores for the above subcriteria.

Rail Line Access

Score	Descriptive Evaluation
2	• Site served by existing mainline or spur

1	•	Site within 1/2 km of rail line
0	•	No rail line within 1/2 km.

Coastal Access

Score	Descriptive Evaluation	
2	•	Site has frontage on coast and deep water channel access
1	•	Site has coastal frontage but no deep water channel access
0	•	Site does not have coastal frontage

Site Roadway Access

Score	Descriptive Evaluation	
3	•	State Arterial Roadway Facility
2	•	County Roadway Facility
1	•	Town Roadway Facility
0	•	Residential Street

Traffic Operations Level of Service

Score	Descriptive Evaluation	
3	•	Stable Traffic Flow Operations with no major roadway design or safety deficiencies

2	•	Stable Traffic Flow Conditions with minor roadway design or safety deficiencies
1	•	Peak Hour Traffic Congestion with minor roadway design or safety deficiencies
0	•	On-Going Traffic Congestion and/or major roadway design or safety deficiencies.

SURFACE WATER

Key Issues

Water bodies could potentially be affected by stormwater runoff or construction related sedimentation and erosion regardless of residuals management technology. Presence on-site (or close proximity) of a surface water body may affect the development potential of a site, or limit the number of development options available. In evaluating the on-site presence or proximity of surface water bodies, the 100-year flood zone is considered to be the planning standard within which facilities, in most instances, should not be constructed. These flood zones, as defined by the Federal Insurance Administration, represent the "high water mark" of surface water bodies over a 100-year period.

In addition to surface water body proximity, two other factors should be considered in siting a facility: the current use and quality of nearby water bodies. Presence of pristine water bodies used for municipal water supply would be more significant than lower quality water bodies used for industrial purposes.

A number of Federal and State regulations regarding surface water quality would apply to the implementation of a residuals management facility in addition to the broad mandates of NEPA and MEPA. The Water Pollution Control Act of 1972 and the Clean Water Act of 1977 set standards and requirements for discharges to surface water bodies. On the state level, the Massachusetts Clean Water Act, the Massachusetts Surface Water Discharge Permit Rules (CMR Title 312) and the Massachusetts Surface Water Quality Standards (CMR Title 314) establish permitting procedures; regulate discharges to surface water bodies; prescribe water quality criteria to sustain designated surface water body uses; and, contain regulations to achieve and maintain certain levels of water quality.

Two Army Corps of Engineers permits may be required by the facility. A Section 10 permit is generally required to place a physical structure (i.e. pier, intake or discharge structure) and a Section 404 permit is required for the discharge or dredge of fill material into navigable waters. Any construction work which alters a waterway would also be subject to the requirements set forth in Massachusetts P.L. Chapter 91. Any activity within 100 feet of a wetland or surface water body would also be subject to the Massachusetts Wetlands Protection Act (310 CMR 10.00).

Landfilling options would be subject to runoff requirements of 310 CMR 1900, the Massachusetts Solid and Hazardous Waste siting regulations.

<u>Data Resources</u>

Data resources that will be used to assess site suitability in terms of surface water quality include:

- Federal Emergency Management Administration (FEMA) Flood Insurance Rate Maps (FIRM)
- USGS topographic maps
- SCS soil surveys
- DEQE surface water maps
- Published stream flow data

Site Suitability Scale

The site suitability scale for surface water is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Proximity to surface water bodies	3
• Proximity to 100 year flood zone	2
• Water quality classification	5
Total	10

The surface water suitability score assigned to each site will be the sum of separate scores for the above subcriteria.

Proximity to Surface Water Bodies

Score	Descriptive Evaluation
3	• Nearest surface water body greater than 1/2 kilometer from site.
2	• Nearest surface water body greater than 100 meters from site.
1	• Surface water body on-site but comprising less than 25% of the site, or within 100 meters from site.
0	• Surface water body zone on-site and comprising greater than 25% of the site.

Proximity to 100 Year Flood Zone

Score		Descriptive Evaluation
2	•	Nearest 100 year flood zone* greater than 100 meters from site.
1	•	100 year flood zone on-site but comprising less than 25% of the site.
0	•	100 year flood zone on-site and comprising greater than 25% of the site.

Water Quality Classification**

Score		Descriptive Evaluation
5	•	Class C (or nearest surface water body > 1/2 km)
3	•	Class B
0	•	Class A

*The 100-year floodplain is defined by the Federal Emergency Management Administration on Flood Insurance Rate Maps (FIRM) for each community.

**Water quality classification is assigned by Massachusetts DEQE.

Key Issues

Ground water issues generally considered in siting facilities include the presence or proximity of aquifers or wells, the use of those aquifers or wells, and their yield. Sites underlain with aquifers would be considered less desirable than those without aquifers, as the aquifers could potentially be contaminated with facility-related leachate or, in the case of larger developments, ground-water recharge could be affected by the project-related increase in impervious area.

The major federal legislation regarding ground-water quality that might be applicable to the implementation of residuals management facility is the Resource Conservation and Recovery Act (RCRA) which specifies requirements for handling any hazardous wastes stored at the site. Subtitle I of RCRA deals with the underground storage tank program (UST) which regulates the storage of hazardous products and substances in underground tanks. Also, EPA is in the process of implementing a national groundwater protection strategy which will provide guidelines for the application of RCRA to groundwater issues.

On the state level, the Massachusetts Groundwater Discharge Permit Program (314 CMR 5.00) specifies the permit requirements for discharges to groundwater. Massachusetts Groundwater Quality Standards (314 CMR 6.00) provides a groundwater classification system and water quality standards for each class.

Data Resources

Information on groundwater and aquifers in the vicinity of the sites to be evaluated are available from:

- DEQE Water Supply Protection Atlas
- DEQE Aquifer Information Maps
- USGS Hydrologic Atlases

Site Suitability Scale

The site suitability scale for groundwater is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Aquifer presence	2
• Well yield potential	4
• Proximity to drinking water wells	4
Total	10

The groundwater suitability score assigned to each site will be the sum of separate scores for the above subcriteria.

Aquifer Presence

Score	Descriptive Evaluation
2	• No aquifer present, or U classification.
1	• Aquifer present but extremely saline and not usable for drinking water.
0	• Aquifer present and potentially usable for drinking water.

Well Yield Potential

Well yield potential cutoffs used in the scaling below correspond with those reflected in DEQE groundwater maps.

Score	Descriptive Evaluation
4	• Low well yield (< 10 gal/min)
2	• Moderate well yield (10-300 gal/min)
0	• Substantial well yield (> 300 gal/min)

Proximity to Drinking Water Wells

The distance to a water well within which development would affect the well is dependent on a number of factors that are site and well specific. The cutoff distances selected below represent general planning standards and good engineering practices.

Score	Descriptive Evaluation
4	• Greater than 1 km
2	• 500 m - 1 km
1	• 100 m - 500 m
0	• less than 100 m

WETLANDS

Key Issues

Wetlands represent unique environmental resources requiring particular concern in selecting sites for development. Wetlands can be significant to: public or private water supply; ground water supply; flood control; storm damage prevention; prevention of pollution; and, the protection of fisheries.

The plant communities, soils and associated low, flat topography of wetlands often remove or detain sediments, nutrients (such as nitrogen and phosphorous) and toxic substances (such as heavy metal compounds) that occur in runoff and flood waters.

Some nutrients and toxic substances are detained for years in plant root systems or in the soils. Others are held by plants during the growing season and released as the plants decay in the fall and winter. This latter phenomenon delays the impacts of nutrients and toxins until the cold weather period, when such impacts are less likely to reduce water quality.

Presence of on-site wetlands can limit the development potential of a site. Wetlands offsite but in close proximity to a facility could be affected by stormwater runoff and leachate associated with the site.

The Massachusetts Wetland Protection Act, MGL Chapter 131, Section 40 prohibits the disturbance of wetland habitat without first filing a notice of intent with the local conservation commission and obtaining an Order of Conditions approving such work. Land subject to protection under the wetlands laws include:

- bordering vegetated wetlands
- lands under water bodies
- land subject to tidal action
- land subject to flooding
- land subject to coastal storm flowage

A 100 foot buffer zone surrounding the above areas is also regulated by these laws.

Additional constraints are imposed upon work which would disturb a Bordering Vegetative Wetland (BVW) defined as freshwater wetlands bordering creeks, streams, ponds and lakes. These constraints prohibit the loss of greater than 5,000 square feet of BVW. Between 500 to 5,000 square feet may be taken if the same quantity of BVW is replaced within the general area and an Order of Conditions permits such work. Also, an Order of Conditions may be issued to allow the disturbance of up to 500 square feet of a BVW without replacement.

Under certain conditions, modification of a wetland would require a Section 404 permit, issued by the Army Corps of Engineers.

Data Resources

The site suitability screening assessment will be based primarily upon the National Wetlands Inventory developed by the U.S. Fish and Wildlife Service.

Site Suitability Scale

The site suitability scale for wetlands is comprised of the following subcriteria scales:

Site Feature	Maximum Points Available
• Wetland presence on-site	6
• Proximity to off-site wetlands	4
Total	10

The wetlands suitability score assigned to each site will be the sum of separate scores for the above subcriteria.

Wetland Presence

Score	Descriptive Evaluation
6	• No wetlands found on-site.
4	• Site contains wetlands comprising up to 10 percent of site area.
2	• Site consists of 10-25 percent wetlands.
0	• Site consists of >25 percent wetlands.

Proximity to Off-Site Wetlands

Score	Descriptive Evaluation
4	• No wetlands off-site within 1/2 km.
2	• No wetlands off-site within 100 meters.
0	• Off-site wetlands exist within 100 meters.

Key Issues

The primary law governing the protection of threatened or endangered species and their critical habitat is the Endangered Species Act of 1973. The act provides "... a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved...". Any project which is found to impinge upon critical habitat of species on, or considered for inclusion on, the federal list of protected species must be approved by the U.S. Secretary of the Interior.

Another federal statute, the Fish and Wildlife Coordination Act, provides the Secretary of the Interior with the authority to protect all species of wildlife and their habitat. This law applies particularly to the impounding, diverting, or controlling of waters and requires consultation with the Secretary, the U.S. Fish and Wildlife Service and the appropriate state agency before any action can be initiated.

The Massachusetts Wetlands Regulations contain special provisions for the protection of aquatic habitat (310 CMR, 10.56), specifically, land under water bodies and water ways. Any proposed work within this environment cannot impair water carrying capacity, ground and surface water quality, and the capacity of the water body to provide breeding habitat, escape cover and food for fisheries.

Massachusetts General Law C.131 Sec. 41 protects inland waters of the Commonwealth by prohibiting or regulating discharge of waste if, in the opinion of the fish and game director, fisheries residing in the waters are of sufficient value. Similarly, MGL C.131 Sec. 42 protects fish of inland waters by prohibiting the discharge into Massachusetts waters of any material which may directly or indirectly injure or kill fish or fish spawn.

Permitting and implementation of any RMFP technology, or any site, from an ecological standpoint, requires demonstration that threatened or endangered species, aquatic habitats or fisheries, will not be significantly impacted.

Data Resources

The USGS topographic maps, MAPC land use maps, water quality classifications (Massachusetts 314 CMR), USGS hydrologic surveys and field survey verification will all be used to characterize the ecological setting on-site and off-site. The Massachusetts Natural Heritage Program has agreed to provide information on threatened or endangered species in the area.

Site Suitability Scale

The site suitability scale for ecology consists of separate scales for the following subcriteria:

Site Feature	Maximum Points Available
• Threatened or endangered species	4
• Terrestrial ecology	2
• Aquatic ecology	4
Total	10

The ecology suitability score assigned to each site will be the sum of separate scores for each of the above subcriteria. Review distances for potential impacts to threatened or endangered species reflected below are based on typical wildlife ranges and anticipated impact significance areas as well as previous siting study experience.

Threatened or Endangered Species

Score	Descriptive Evaluation
4	• No threatened or endangered species sitings within 2 km of site; and no suitable habitat for wildlife on-site; or, site is developed.
2	• Suitable habitat for wildlife on-site, but not within known migratory path of threatened or endangered species and no sitings within 2 km.
1	• Sitings of threatened or endangered species within 1 km of site and suitable habitat on-site.
0	• Sitings of threatened or endangered species on-site and suitable habitat on-site.

Terrestrial Ecology

Score	Descriptive Evaluation
2	• Site largely devoid of significant terrestrial (flora and/or fauna) communities or is developed
1	• Site undeveloped and contains significant terrestrial communities, but similar communities are in abundance in general area
0	• Site consists of significant terrestrial communities which are largely unique for the general area.

Aquatic Ecology

Score	Descriptive Evaluation
4	• No significant aquatic habitat found on-site
2	• Aquatic habitat on-site but water quality classification C*
1	• High quality aquatic habitat (Water Quality Classification A or B), but similar habitat in abundance in area.
0	• High quality (Water Quality Classification A or B) habitat unique for general area.

* Since there is no complete listing of ecological information for all bodies of water in the MWRA region, aquatic ecology must be assumed a function of water quality for the map-level review. Water with a rating of A or SA can be assumed to support a diverse range of flora and fauna while Water Quality Classification C would be expected to host a less diverse community dominated by pollution tolerant species.

AIR QUALITY

Key Issues

The key regulations affecting air quality are the Clean Air Act and Amendments and the Massachusetts Air Pollution Control Regulations (Title 310). The Clean Air Act and Amendments authorize the regulation of both mobile and stationary sources of air pollution, and establish the National Ambient Air Quality Standards (NAAQS). The Massachusetts Air Pollution Control Regulations establish source approval criteria and specific emission limitations applicable to various source types, including Best Available Control Technology (BACT).

The source emission rates of the selected residuals management technology(ies) and the NAAQS attainment status of the host community(ies) will, to a large extent, determine the level of regulatory review. For example, prevention of significant deterioration (PSD) applicability, non-attainment review, the need to achieve emissions offsets, and the applicability of the Massachusetts one-hour NO_2 guideline will depend on source emission strengths and attainment designations. Any proposed emission sources will also have to demonstrate compliance with the Massachusetts Acceptable Ambient Levels (AAL's) of toxic air pollutants.

Data Resources

Most of the information required to assess site suitability at the first tier level can be obtained through review of USGS topographical quadrangles, MAPC land use maps, and the Massachusetts Air Quality Data Reports.

Site Suitability Scale

The suitability scale for air quality consists of separate scales for the following subcriteria.

Site Feature	Maximum Points Available
• Impact area characteristics	3
• Dispersion characteristics:	
- Ventilation	2
- Terrain	1
• Existing Air Quality/ source characteristics:	
- Attainment status	2
- Industrial land use	2
Total	10

The air quality suitability score assigned to each site will be the sum of separate scores for each of the above subcriteria. In general, a review distance of 3 km was selected because:

- Highest concentration impacts would be expected to occur within this distance.
- Other sources of air pollution (industrial areas) within 3 km could be expected to impact the same area.
- In general, a nearly homogeneous dispersion environment exists within a radius of 3 km.

Impact Area Characteristics

The site suitability scale for impact area characteristics is based on populated area proximity.

Score		Descriptive Evaluation
3	•	Population density is light within 3 km (Residential area < 20%)
1	•	Population density is moderate within 3 km (Residential area 20% - 60%)
0	•	Population density is dense within 3 km (Residential area > 60%)

Dispersion Characteristics

The site suitability score for dispersion characteristics is the sum of separate scores for ventilation and terrain within 3 km.

Ventilation Characteristics --

Score		Descriptive Evaluation
2	•	Generally good wind exposure and overall ventilation characteristics
0	•	Poor ventilation characteristics; low lying areas or valleys

Terrain Considerations --

Score		Descriptive Evaluation
1	•	Flat, gently rolling terrain, or coastal
0	•	Complex terrain

Existing Air Quality/Source Characteristics

The site suitability score for existing air quality/source characteristics is the sum of separate scores for attainment status and industrial land use within 3 km of the site. The entire State is in attainment of the NAAQS for SO_2 and NO_2 and in contravention of the NAAQS for O_3. Therefore attainment status is assessed only for TSP and CO.

Attainment Status --

Score		Descriptive Evaluation
2	•	Site is in an attainment area for both TSP and CO.
1	•	Site is in an attainment area for either TSP or CO, but not both.
0	•	Site is a nonattainment area for both TSP and CO.

Industrial (Pollutant emitting activities) Land Use Within 3 km --

Score		Descriptive Evaluation
2	•	Light density of industrial land use within 3 km (industrial area < 10%)
1	•	Moderate density of industrial land use within 3 km (industrial area 10% - 40%)
0	•	Heavy density of industrial land use within 3 km (industrial area > 40%)

APPENDIX B

SITE SCREENING CRITERIA ATTITUDINAL SURVEY

MASSACHUSETTS WATER RESOURCES AUTHORITY
RESIDUALS MANAGEMENT FACILITIES PLAN
SITE SCREENING ANALYSIS

SITE SCREENING CRITERIA ATTITUDINAL SURVEY

THE PURPOSE OF THIS QUESTIONAIRE

The Massachusetts Water Resources Authority needs to identify, and then evaluate, potential sites for new facilities that will process the residuals (sludge) that are a byproduct of treating municipal wastewater. This questionaire is intended to get your opinions on the relative importance of various criteria, or factors, that will be considered in the MWRA's evaluation of potential sites for these facilities.

Over 200 site "candidates" will be screened during the first phase of this siting process, called the "First Tier Site Screening Analysis." Then the initial list of site candidates will be narrowed to a "short list" of approximately 20 sites, and, in the final phase of the siting effort, 3-6 candidate options will be subjected to more intensive evaluation ("Candidate Options Evaluation") to select the final site, or sites, for the MWRA's residuals management facility(ies).

There are a number of different technologies, from composting and land disposal to incineration, that can be employed to manage wastewater treatment residuals. A site that is suitable for one type of technology may not be appropriate for another type of technology, and vice-versa. However, in accordance with the Special Procedures established by the Secretary of Environmental Affairs, the First Tier Site Screening Analysis will not take into account whether any given site is more or less well suited to a particular technololgy. Rather, the first tier site screening will be technology-independent. In the later phases of the site screening analysis, technology-specific evaluations will be conducted in selecting and evaluating the 3-6 candidate options, and technology-specific site suitability criteria will be developed to guide that process.

HOW TO COMPLETE THIS QUESTIONAIRE

The site evaluation criteria listed in Table 1 identify various site characteristics that will be considered when determining the suitability of sites included in the First Tier Site Screening Analysis.

To save time and make the results of this Questionaire more usefull, related criteria have been grouped into 10 categories, such as "Engineering Parameters", "Noise Environment", and "Ecology". Data dealing with the criteria in each category have been gathered for each of the the 200+ sites being evaluated. These data are also being verified through site inspections.

In order to develop a more uniform system of evaluation, a team of technical specialists will rate each site's suitability in each category on a scale from 0 to 10 (0 for totally <u>unsuitable</u> and 10 for totally <u>suitable</u>). Hence, each site will be given 10 "Suitability Scores" that reflect the professional judgements of the rating team.

But, some criteria should carry more weight than others in determining site suitability, and that's where your views will play a critical role. We want you to indicate how much weight you would put on each of the 10 categories of criteria in judging the suitability of a particular site for the MWRA's residuals management facility. The

results of this survey will help determine the "weighting factor" for each category.

TWO QUESTIONS TO ANSWER

This survey consists of two questions. In the first question, you are asked to weigh each category of criteria by indicating whether it is:

- o Very important
- o Fairly important
- o Not very important
- o Not at all important

Keep in mind that your responses should not be linked with any specific type of residuals management technology.

In the second question, you are asked to divide up a total of 100 "weighting points" by assigning some portion or none of those 100 points to each category of criteria, depending on how much importance you believe should be given to the criteria in that category. You may assign any number of points to any category, so long as the total number of points you allocate for all of the categories adds up to 100, no more and no less.

Remember, the answers from this survey will be a significant determinant of the weight given to the various criteria that will be used to evaluate potential sites for MWRA's residuals management facility(ies), in the First Tier Site Screening Analysis.

TABLE 1. CRITERIA USED TO EVALUATE SITE SCREENING ATTRIBUTES

SITE ATTRIBUTE	EVALUATION CRITERIA
Engineering Parameters	o Base soil type and characteristics o Topography o Depth to Bedrock
Noise Environment	o Proximity to sensitive receptors o Proximity to existing major noise sources
Land Use/Zoning	o Current land use and zoning for site o Current land use and zoning for site vicinity o Potential consistency with existing land uses o Proximity to sensitive receptors o Proximity to existing residential, open space or recreation areas
Cultural Resources	o Proximity to Historical Register sites o Proximity to other landmarks of historical or archeological significance
Transporation/ Traffic	o Site roadway access configuration o Nearby traffic operational characteristics
Surface Water	o Proximity to water bodies and flood zones o Surface water body use o Water quality classification
Groundwater	o Presence and use of aquifers o Proximity to drinking water wells o Well yield
Wetlands	o Presence of or proximity to wetlands
Ecology	o Presence of threatened or endangered species o Terrestrial and aquatic ecological habitats
Air Quality/Odors	o Proximity to sensitive receptors o Proximity to populated areas o General dispersion environment o Existing air quality and nearby emissions sources

QUESTION 1:

How would you rate the relative importance of the following site characteristics in determining the overall suitability of a site to be considered as a potential location for a residuals management facility? (circle the answer that best applies)

SITE CHARACTERISTIC	RELATIVE IMPORTANCE RATING			
Engineering Parameters	very important	fairly important	not very important	not at all important
Noise	very important	fairly important	not very important	not at all important
Land Use/Zoning	very important	fairly important	not very important	not at all important
Cultural Resources	very important	fairly important	not very important	not at all important
Transportation/ Traffic	very important	fairly important	not very important	not at all important
Surface Water	very important	fairly important	not very important	not at all important
Groundwater	very important	fairly important	not very important	not at all important
Wetlands	very important	fairly important	not very important	not at all important
Ecology	very important	fairly important	not very important	not at all important
Air Quality/ Odors	very important	fairly important	not very important	not at all important

QUESTION 2:

Sites have been assigned suitability scores for each of the following site characteristics. In deriving a single overall site suitability score, each individual characteristic (or attribute) score will be weighted based on your allocation of 100 weighting points.

How would you allocate your 100 weighting points?

SITE CHARACTERISTIC	WEIGHTING POINTS
Engineering Parameters	____________
Noise Environment	____________
Land Use/Zoning	____________
Cultural Resources	____________
Transportation/ Traffic	____________
Surface Water	____________
Groundwater	____________
Wetlands	____________
Ecology	____________
Air Quality/Odors	____________
TOTAL POINTS	100

APPENDIX C

SITE SCREENING ANALYSIS DATA COLLECTION FORM

MWRA Map-Level Analysis Site #: ______

Date: ________ Analyst: ____________________

USGS TOPOGRAPHIC MAP

Physical Data

Quad Name: ____________________________________ Site Area (acres): ________

Site Dimensions (m): Length: _______ Width: _______

Site Location: UTMx: ________ UTMy: _______ UTMz: _______

Site Elevation (ft): Min: _______ Max: _______

General Slope: 0-3% 3-10% 10-20% >20% Direction: N S E W

Utilities On-site: Yes No Describe:

Comments:

Air Quality

Highest Terrain (3 km radius): ______

Greater than 5 peaks 100 ft. above site elevation: Yes No

Topographical Characteristics: Flat Gently Rolling Coastal Low Lying

Dispersion Environment:

General Land Use	Percent Coverage
Residential	________
Commercial/Industrial	________
Other	________

Attainment Status:
(see town lists)

	TSP	CO
1. Attainment Area	___	___
2. Non-Attainment Area	___	___
3. Attainment Area within 3 km of NA Area	___	___

Comments:

MWRA Map-Level Analysis Site #:______

Date:________ Analyst:____________________

USGS TOPOGRAPHIC MAP

Transportation

Roadways:

Primary Road Name:____________________________ Distance from site(km):_____

Second. Road Name:____________________________ Travel Distance(km):______

Second. Road Name:____________________________ Travel Distance(km):______

Railroad(within 2 km): Yes No

Number of Tracks:____ Station/Terminal: Yes No

Navigable Waterways(adjacent): Yes No

Name:______________ Approx. Width:______ Depth:______

Pier/Wharf: Yes No Bridges: Yes No Clearance:_____

Comments:

Sensitive Receptors

Name/Description	Distance(meters)	Quadrant(N,S,E,W)

Comments:

MWRA Map-Level Analysis Site #:______

Date:________ Analyst:__________________

USGS TOPOGRAPHIC MAP

Surface Water

Drainage Basin Names:_______________________________

Standing Water On-site %:_______

Distance to nearest surface water (km):______

Identity of Surface Water: Name/Description Classification(310 CMR)

Comments:

MWRA Map-Level Analysis Site Location:__________ Site #:______

Date:_______ Analyst:__________

USFWS WETLANDS MAP

Wetlands

On-site: Acreage USFWS Code

Off-site(2 km): Acreage Distance(m) USFWS Code

Comments

MWRA Map-Level Analysis   Site Location:____________ Site #:______

Date:________ Analyst:____________

FEMA FLOOD MAP

Floodplain

On-site Percent Coverage: 100 Year:______

Comments:

Off-site Distance(m):   100 Year:______

Comments:

MWRA Map-Level Analysis Site Location:____________ Site #:______

Date:_________ Analyst:_____________

MAPC LAND USE MAP

Land Use

On-site:

Percent Coverage	Category
_______	INDUSTRIAL
_______	COMMERCIAL
_______	RESIDENTIAL
_______	OPEN/REC
_______	FOREST
_______	AGRICULTURAL

Off-site(1 km):

Percent Coverage	Category
_______	INDUSTRIAL
_______	COMMERCIAL
_______	RESIDENTIAL
_______	OPEN/REC
_______	FOREST
_______	AGRICULTURAL

Comments: Presence of buffers, abutting land use, etc.

Key:

Category	MAPC Codes
Industrial:	UI, UW, M
Commercial:	UC
Residential:	R1, R2, R3
Open/Rec:	UO, O, RW, RP, RS
Forest:	F
Agricultural:	AC, AP

MWRA Map-Level Analysis Site Location:____________ Site #:_______

Date:________ Analyst:_____________

ZONING MAP

Zoning

On-site:

Percent Coverage	Category
________	INDUSTRIAL
________	COMMERCIAL
________	RESIDENTIAL
________	OTHER

Off-site(1 km):

Percent Coverage	Category
________	INDUSTRIAL
________	COMMERCIAL
________	RESIDENTIAL
________	OTHER

Comments

MWRA Map-Level Analysis Site Location:____________ Site #:_______

Date:________ Analyst:____________

DEQE GROUNDWATER MAP

Ground Water

On-site:

Aquifers(list):

Yield(H, M, L)	Value(gpm)	Percent Coverage

Wells(list):

Type/Use	Yield(gpm)	Depth to Water Table(ft)

Comments:

Off-site(2 km):

Aquifers(list):

Yield(H, M, L)	Value(gpm)	Percent Coverage

Wells(list):

Type/Use	Yield(gpm)	Distance to Boundry(m)	Direction (N,S,E,W)	Depth to Water Table(ft)

Comments:

MWRA Map-Level Analysis Site Location:_____________ Site #:_______

Date:________ Analyst:____________

DEQE GROUNDWATER MAP

Surface Public Water Supplies

Name	Type/Use	Distance to Boundry(m)

Comments:

MWRA Map-Level Analysis   Site Location:____________ Site #:_______

Date:________ Analyst:____________

DEQE WASTE SOURCE MAP

Waste Sources

On-site: Yes No

List:

Off-site: Yes No

List:

Comments:

MWRA Map-Level Analysis Site Location:____________ Site #:_______

Date:________ Analyst:____________

USDA/SCS MAP

Soils

On-site:

Type	Percent Coverage	Drainage Class

Comments:

MWRA Map-Level Analysis Site Location:___________ Site #:_______

Date:________ Analyst:____________

NATURAL HERITAGE

Threatened and Endangered Species

On-site:

# Species	Breeding	Resident	Migratory	Habitat
Flora	NA		NA	
Fauna				

Off-site(1 km):

# Species	Breeding	Resident	Migratory	Habitat
Flora	NA		NA	
Fauna				

Historical

Number On-site:____

Number Off-site(1 km):____

Comments (describe if possible)

ASSESSOR OFFICE AND DEVELOPMENT INVESTIGATION SITE#:___________

DATE:________ TIME:________ ANALYST:____________ TOWN:__________

ON SITE:
Identify Parcels - Acreage and Owner - (Assessor Office):

Development Proposal for Site (Engineering or Planning Dept.):

OFF SITE:
Identify Contiguous Parcels of Land - Acreage and Owner (Assessor Office):

Development Proposal for Abutting Lands (Engineering or Planning Dept.):

ADDITIONAL: Please sketch the on-site parcel division lines on the topo sheet in the individual file. Note any possible contiguous sites that might increase current site acreage. If an investigation of this off-site land is necessary for confirmation, please complete the visit or note the need. Please keep track of the names of the people with whom you speak:

MWRA Field Survey Site #:________

Date:__________ Time:__________ Survey Team:___________________________

<u>**On-site Land Use**</u>(describe)

<u>**Abutting Land Use**</u>(describe)

<u>**Sensitive Receptors**</u>(additional)

MWRA Field Survey Site #:_______

Date:__________ Time:__________ Survey Team:__________________________

<u>Noise</u>

General Environment: Quiet Noisy Very Noisy

Sources(list): <u>Description Approx. Distance</u>

<u>General Comments</u>

Include buffers, transportation, water resources etc. Use reverse side if necessary. Focus on aspects of site not found on data sheets.

MWRA Field Survey   Site Location:____________ Site #:________

Date:_________ Time:_________ Survey Team:________________________________

PHOTO CHECK LIST

Roll #	Picture #	Description

Comments: